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Application of: Bill L. Davis and Jesse S. Williamson

Entitled: COMBINED LITHOGRAPHIC/FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS

For: Reissue of U.S. Patent 5,630,363

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SUPPLEMENTAL STATEMENT OF PRIOR ART AND OTHER INFORMATION

APPENDIX 1

I. Documents Pertinent to Series Commencing with UnitedStates Serial No. 08/435,798 filed May 4, 1995

Index No.	Description
1	European Patent Application No. EP 0741 025 A3 entitled: Retractable Inking /Coating Apparatus having Ferris Movement between Printing Units Applicant: Howard W. DeMoore; Inventors: Howard W. DeMoore, Ronald M. Rendleman and John W. Bird; Filed: May 5, 1993; Date of Publication A2: November 6, 1996
2	U.S. Patent No. 4,841,903 entitled: Coating and Printing Apparatus Including An Interstation Dryer, Issued on June 27, 1989 to John W. Bird, Assignee: Birow, Inc.
3	U.S. Patent No. 5,107,790 entitled: Two Headed Coater, Issued on April 28, 1992 to Larry J. Sliker and Robert S. Conklin, Assignee: Rapidac Machine Corp.
4	U.S. Patent No. 5,335,596 entitled: Coating Apparatus for Sheet-Fed, Offset Rotary Printing Presses, Issued on August 9, 1994 to Howard W. DeMoore and Steven M. Person, Assignee: Howard W. DeMoore

Index No.	Description
5	U.S. Patent No. 4,617,865 entitled: Liquid Coater for a Printing Press with Moveable Inking Roller and Tray, Issued on October 21, 1986 to Thomas G. Switall, Assignee: Ryco Graphic Manufacturing, Inc.
6	U.S. Patent No. 4,825,804 entitled: Vertically Retracting Coater, Issued on May 2, 1989 to Mark A. Dirico and Phillip Rodriguez, Assignee: Dahlgren International, Inc.
7	European Patent Application No. EP 0647 524 A1 entitled: High Velocity, Hot Air Dryer and Extractor, Applicant: Howard W. DeMoore; Inventors: Howard W. DeMoore and Howard Curtis Secor; Filed: August 5, 1994; Date of Publication: April 12, 1995
8	Papier Kunstsoff Verabeiter, vol 26 (no. 6), 1 June 1991 at p. 129 Xpooo232825 "Lakier-Aggregat Fuer Speedmaster-Maschinen"
9	Prosecution History of Canadian Patent No. 2,175,731 entitled: Retractable Inking/Coating Apparatus Having Ferris Movement Between Printing Units Inventors: Howard W. DeMoore, Ronald M. Rendleman and John W. Bird Owner: Howard W. DeMoore, Filed on May 3, 1996
10	Japanese Patent Application No. 63-62733
11	U.S. Patent No. 4,882,991 entitled: Change-Over Inking Unit of a Sheet-Fed Rotary Press, Issued on November 28, 1989 to Claus Simeth, Assignee: M.A.N. Roland Druckmaschinen Aktiengesellschaft
12	Japanese Application No. 96146371 entitled: Retractable Inking/Coating Apparatus Having Ferris Movement Between Printing Units

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(54) Retractable inking/coating apparatus having ferris movement between printing units

(57) A retractable in-line inking/coating apparatus (10) selectively applies either spot or overall ink/coating material to a blanket (B) or flexographic plate (P) on a blanket cylinder (34), or spot or overall ink/coating to a flexographic printing plate (P) on a plate cylinder (32) in a rotary offset printing press (12). The inking/coating apparatus is pivotally mounted on a printing unit (22, 24, 26, 28) or dedicated coating unit, and is extendable into and retractable out of an operative inking/coating position by a carriage assembly (58) which is pivotally coupled to the printing unit. Because of the pivotal support provided by a cantilevered support arm (88, 90), the inking/coating apparatus is extended and retracted through a Ferris wheel arc between adjacent printing units.

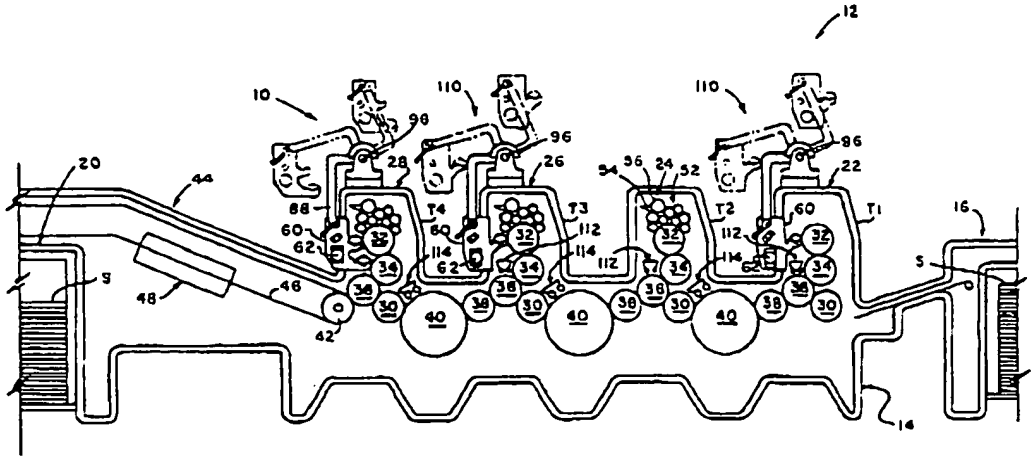

FIG. 1

EP 0 741 025 A2

Description

This invention relates to sheet-fed or web-fed, rotary offset or flexographic printing presses, and more particularly, to a new and improved inking/coating apparatus for the in-line application of printing inks or protective or decorative coatings to sheet or web substrates.

Conventional sheet-fed, rotary offset printing presses typically include one or more printing units through which individual sheets are fed and printed with wet ink. Since the inks used with rotary offset printing presses typically remain wet and tacky for some time after printing, special precautions must be taken to insure that the freshly printed sheets are not marked or smeared as the sheets are transferred from one printing unit to another, and while being conveyed to the sheet delivery stacker. The printed surface of the freshly printed sheet dries relatively slowly and can be smeared during subsequent transfer between printing units. In order to reduce smearing and offsetting, spray powder is applied on the printed sheet.

In some printing applications, offset and smearing are prevented by applying a protective and/or decorative coating over all or a portion of the freshly printed sheets. Various arrangements have been proposed for applying the protective or decorative coating as an in-line operation by using the last printing unit of the press as the coating application unit. However, when such in-line coating is performed, the last printing unit cannot be used to apply ink to the sheets, and can only be used for the coating operation. Thus, while coating with these types of in-line coating apparatus, the press loses the capability of printing its full range of colors since the last printing unit is converted to a coating unit.

It will be appreciated that the time required to reconfigure a press for coating or non-coating is non-productive and costly. Accordingly, there is a need for an in-line coating apparatus that minimizes the time to clean-up from one printing run and set-up and run the next job. Where consecutive jobs require the same type of coating, particularly blanket coating, it may not be necessary to clean-up the coater between jobs. However, the coating material cannot be allowed to dry on the rollers. Therefore, especially when switching from blanket to spot coating or vice versa, or if there is a delay between jobs, it is necessary to wash-up the coater after each job is completed.

In addition, coater wash-up is necessary when switching between different coating compositions, such as aqueous and ultra violet (UV) curable coatings. Such coating materials are not interchangeable, and consequently, the coater must be washed between applications of different coating media.

The foregoing limitations are overcome, according to the present invention, by a retractable, in-line inking/coating apparatus which is mounted on a printing unit for pivotal, Ferris wheel movement between an operative inking/coating position and a retracted, overhead idle position. The inking/coating apparatus includes an applicator head which, is positioned in alignment with either the plate cylinder or the blanket cylinder by a carriage assembly which includes a cantilevered support arm. The support arm is pivotally coupled between the inking/coating head and the printing unit tower. This cantilevered, pivotal mounting arrangement allows the inking/coating unit to be used between two printing units, as well as on the last printing unit of the press.

In the preferred embodiment, the applicator head includes vertically spaced pairs of cradle members with one cradle pair being adapted for supporting a metal or ceramic coating roller in alignment with a blanket cylinder, and the other cradle pair supporting a resilient anilox coating roller in alignment with the plate cylinder, respectively, when the carriage assembly is in the operative position. Because of the cantilevered, pivotal support provided by the support arm, the applicator head can be lifted and lowered through an arc, similar to Ferris wheel movement, in the limited space between adjacent printing units. When fully retracted, the applicator head and carriage assembly are lifted to an elevated, retracted overhead position, preferably an overhead position overlying the printing unit tower, thus providing complete access to the interstation space and the printing unit cylinders without causing the printing unit to lose its printing capability. The inking/coating applicator roller of the applicator head can be inspected, cleaned or replaced and the doctor blade assembly can be washed-up automatically while the inking/coating apparatus is in the retracted position.

When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous ink or aqueous coating, the water component of the aqueous ink or coating on the freshly printed sheet is evaporated by a high velocity, hot air interstation dryer and a high volume heat and moisture extractor assembly so that the freshly printed ink or coating is completely dry before the sheet is printed on the next printing unit. This quick drying flexographic printing/coating arrangement permits a base coat of ink, for example opaque white or metallic ink (gold, silver or other metallics) to be applied in the first printing unit, and then overprinted by a lithographic process on the next printing unit.

Exemplary embodiments of the present invention are illustrated in the drawing figures wherein:

FIGURE 1 is a schematic side elevational view of a sheet-fed, rotary offset printing press having inking/coating apparatus embodying the present invention;

FIGURE 2 is a perspective view of the printing press of FIGURE 1 in which a dual head inking/coating apparatus is in the operative coating position and a single head coater is in a retracted, overhead position;

FIGURE 3 is an enlarged simplified perspective view showing one side of the single head ink-

ing/coating apparatus of FIGURE 1 in the operative position;

FIGURE 4 is a simplified side elevational view showing the dual head inking/coating apparatus in the operative coating position for spot or overall coating from the blanket position;

FIGURE 5 is a simplified side elevational view showing the single head inking/coating apparatus in the operative coating position for spot or overall coating from the plate position; and,

FIGURE 6 is a simplified side elevational view of the dual head inking/coating apparatus of FIGURE 4, partially broken away, which illustrates the hydraulic drive assembly and doctor blade assembly.

As used herein, the term "processed" refers to various printing methods which may be applied to either side of a substrate, including the application of UV-curable and aqueous inks and/or coatings. The term "substrate" refers to sheet or web material. Also, as used herein, the term "waterless printing plate" refers to a printing plate having non-image surface areas which are hydrophobic and also having image surface areas which are hydrophilic, wherein the non-image surface areas are characterized by a surface tension value which is less than the surface tension of aqueous ink, and the image surface areas are characterized by a surface tension value which is greater than the surface tension of aqueous ink. "Flexographic" refers to flexible printing plates having a relief surface which is wettable by aqueous ink or aqueous coating material.

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line inking/coating apparatus 10, for applying inks or protective and/or decorative coatings to sheets or webs printed in a sheet-fed or web-fed, rotary offset or flexographic printing press, herein generally designated 12. In this instance, as shown in FIGURE 1, the inking/coating apparatus 10 is installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation Heidelberg Speedmaster 102V. The press 12 includes a press frame 14 coupled at one end, herein the right end, to a sheet feeder 16 from which sheets, herein designated S, are individually and serially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the freshly printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical rotary offset printing units 22, 24, 26 and 28 which can print different color inks onto the sheets as they are transferred through the press 12. The printing units are housed within printing towers T1, T2, T3 and T4 formed by side frame members 14, 15.

As illustrated, the printing units 22, 24, 26 and 28 are substantially identical and of conventional design. The first printing unit 22 includes an in-feed transfer cylinder 30, a plate cylinder 32, a blanker cylinder 34 and an impression cylinder 36, all supported for rotation in parallel alignment between the press side frames 14, 15. Each of the first three printing units 22, 24 and 26 have an interunit transfer cylinder 38 disposed to transfer the freshly printed sheets from the adjacent impression cylinder to the next printing unit via an interstation transfer cylinder 40. The last printing unit 28 is shown equipped with a delivery cylinder 42 which guides each freshly printed sheet 18 as it is transferred from the last impression cylinder 36 to a delivery conveyor system, generally designated 44, to the sheet delivery stacker 20.

The delivery conveyor system 44 as shown in FIGURE 2 is of conventional design and includes a pair of continuous delivery gripper chains 46, only one of which is shown carrying at regular spaced locations along the chains, laterally disposed gripper bars having gripper fingers for gripping the leading edge of a freshly printed sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing unit 28. As the leading edge is gripped by the grippers, the delivery chains 46 pull the freshly printed sheet away from the impression cylinder 36 and deliver the freshly printed sheet to the sheet delivery stacker 20.

Prior to reaching the delivery sheet stacker, the freshly printed and/or coated sheets S pass under a delivery dryer 48 which includes a combination of infrared thermal radiation, high velocity hot air flow and heat and moisture extraction for drying the ink and/or the protective/decorative coating on the freshly printed sheets.

In the exemplary embodiment shown in FIGURE 1, the first printing unit 22 is equipped with a flexographic printing plate, and does not require an inking roller train or a dampening system. If an ink roller train is mounted on the first printing unit, the form rollers are retracted and locked off when the printing unit goes on impression. Flexographic aqueous ink is supplied by the inking/coating unit 110. The remaining printing units 24, 26 and 28 are equipped for lithographic printing and include an inking apparatus 50 having an inking roller train 52 arranged to transfer ink from an ink fountain 54 to the plate cylinder 32. This is accomplished with the aid of a fountain roller 56 and a ductor roller. The fountain roller 56 projects into the ink fountain 54, whereupon its surface is wetted with printing ink Q. The printing ink Q is transferred intermittently to the inking roller train 52 by the ductor roller. The inking roller train 52 supplies printing ink Q to the image ares of a printing plate P mounted on the plate cylinder 32.

The printing ink Q is transferred from the printing plate P to an ink receptive blanket B which is mounted on the blanket cylinder 34. The inked image carried on the blanket B is transferred to a sheet S as the sheet is transferred through the nip between the impression cylinder 36 and the blanket B.

The inking roller arrangement 52 illustrated in FIGURE 1 is exemplary for use in combination with lithographic ink printing plates. It will be understood that

dampening rollers (not illustrated) will be in direct engagement with the lithographic plate P, but are not used in combination with the flexographic plate of printing unit 22.

Referring now to FIGURE 4, FIGURE 5 and FIGURE 6, the in-line inking/coating apparatus 10 includes a carriage assembly 58 which supports an applicator head 60. The applicator head 60 includes a hydraulic motor 62, a lower gear train 64, an upper gear train 65, an applicator roller 66 and a doctor blade assembly 68. The external peripheral surface of the applicator roller 66 is inserted into wetting contact with liquid coating material or ink contained in a reservoir 70. The reservoir 70 is continuously supplied with ink or coating which is circulated through the reservoir 70 from an off-press source by a pump (not illustrated). The hydraulic motor 62 drives the applicator roller 66 synchronously with the plate cylinder 32 and the blanket cylinder 34 in response to an RPM control signal from the press drive (not illustrated) and a feedback signal developed by a tachometer 72. While a hydraulic drive motor is preferred, an electric drive motor can be used.

The applicator roller 66 is preferably a fluid metering anilox roller which transfers measured amounts of printing ink or coating material onto the printing plate or blanket. The surface of an anilox roller is engraved with an array of closely spaced, shallow depressions referred as "cells". Ink or coating material from the reservoir 70 flows into the cells as the anilox roller turns through the reservoir. The transfer surface of the anilox roller is scraped with a doctor blade 73 to remove excess ink or coating. The ink or coating remaining on the anilox roller is the measured amounts contained within the cells.

The applicator roller 66 is cylindrical and may be constructed in various diameters and lengths, containing cells of various sizes and shapes. The volumetric capacity of an anilox roller is established during manufacturing and is dependent upon the selection of cell size, shape and number of cells per unit area. Depending upon the intended application, the cell pattern may be fine (many small cells per unit area) or coarse (fewer larger cells per unit area).

By applying the ink or coating material through the inking/coating applicator head 60, more ink or coating material can be delivered to the sheet S as compared with the inking roller train of a lithographic printing unit. Moreover, color intensity is stronger and more brilliant because the flexographic ink is applied at a much larger film thickness than can be applied by the lithographic process and is not diluted by dampening solution.

The inking/coating applicator head 60 includes side frame members 74, 76 that support the applicator roller 66, gear train 64, gear train 65, doctor blade assembly 68 and the drive motor 62. The applicator roller 66 is supported at opposite ends on a lower cradle formed by a pair of end plates 78, 80 which hold the applicator roller 66 in parallel alignment with the blanket cylinder 34 (FIGURE 5). The side frames 74, 76 are also provided with an upper cradle formed by a pair of side plates 82, 84 which are vertically spaced with respect to the lower side plates 78, 80. Each cradle has a pair of sockets 79, 81 and 83, 85, respectively, for holding the applicator roller 66 for spot coating or inking engagement against the plate P of the plate cylinder 32 (FIGURE 4) or the blanket B of the blanket cylinder 34.

Preferably, the applicator roller 66 for the upper cradle (plate) position is an anilox roller having a resilient transfer surface. In the dual cradle arrangement, the press operator can quickly change over from blanket inking/coating and plate inking/coating with minimum press down time, since it is only necessary to remove and reposition or replace the applicator roller 66, and wash-up the doctor blade assembly if changing from ink to coating or vice versa. The capability to selectively operate in either the flexographic mode or the lithographic mode and to print or coat from either the plate or blanket position is referred to herein as the "LITHOFLEX" process.

Referring again to FIGURE 2 and FIGURE 3, the applicator head 60 is supported by the carriage assembly 58 in a cantilevered, pivotal arrangement which allows the dual cradle inking/coating apparatus 10 and a single cradle inking/coating apparatus 110 to be used between any two adjacent printing units, as well as used on the first and last printing units of the press. This is made possible by a pair of cantilevered support arms 88, 90 that are pivotally coupled to the side plates 74, 76, respectively, on a pivot shaft 77. Each support arm has a hub portion 88A, 90A, respectively, and an elongated shank portion 88B, 90B, respectively.

The cantilevered support arms are pivotally mounted on the printing tower by pivot blocks 92, 94, respectively. The hub portions 88A, 90A are journalled for rotation on pivot shafts 96, 98, respectively. The pivot blocks 92, 94 are securely fastened to the tower 14D, so that the carriage assembly 86 is pivotally suspended from the pivot shafts 96, 98 in a cantilevered Ferris support arrangement. The shank portions 88B, 90B are pivotally coupled to the pivot shaft 77, so that the carriage assembly 58 and the applicator head 60 are capable of independent rotation with respect to each other and with respect to tee pivot shaft 77. By this arrangement, the applicator head 60 is pivotally suspended from the pivot shaft 77, and remains in an upright orientation as the support arms rotate from the operative position to the fully retracted position, and vice versa.

Thus, the cradles 78, 80 and 82, 84 position the applicator roller 66 in vertical and horizontal alignment with the plate cylinder or blanket cylinder when the applicator head is extended to the operative position, for example as shown in FIGURE 4 and FIGURE 5. Moreover, because of the transverse relationship between the hub portion and shank portion of the support arms, the applicator head 60 and carriage assembly 58 are capable of rotating through a Ferris arc without touching the adjacent printing tower. This makes it possible to install the inking/coating apparatus 10 on any intermedi-

ate printing unit tower (T2, T3), and as well as on the first printing unit tower T1 and the last printing unit tower T4. Additionally, when the inking/coating unit 10 is in the operative position, the lateral projection of the applicator head 60 into the interstation space between printing units is minimized. This assures virtually unrestricted operator access to the interstation space between adjacent printing units when the applicator head is engaged in the operative position, and completely unrestricted access when the carriage assembly 58 is retracted.

Rotation of the carriage assembly 58 is counterclockwise from the retracted, idle position (shown in phantom in FIGURE 1) to the operative position (FIGURE 4 and FIGURE 5). The carriage assembly 58 can be adapted for clockwise rotation from the retracted position to the operative position for engagement of the applicator roller to either the plate or the blanket on the dampener side of the tower, assuming that access to the plate and blanket is not restricted by dampener rollers or the like.

Rotational movement of the support arms 88, 90 is assisted by counterweights 100, 102 which are secured to the support arms, respectively, for concurrent rotation with respect to the pivot blocks 92, 94. With the passive assistance of the counterweights, the press operator can easily move the inking/coating assembly 10 from the engaged operative position as shown in FIGURE 4 to the fully retracted, idle position as shown in phantom in FIGURE 1. Preferably, rotation of the carriage assembly 58 is assisted by a torsion spring, electric motor or hydraulic motor.

The inking/coating apparatus 10 is releasably locked into the operative position as shown in FIGURE 4 by releasable latch couplings 103, 105 that secure the support arms 88, 90 to the press side frames 14, 15, respectively, of the printing unit tower T4 in the operative position. Coating engagement of the applicator roller 66 against the blanket cylinder 34 is produced by power actuators, preferably pneumatic cylinders 104, 106 which have extendable/retractable power transfer arms 104A, 106A, respectively. The pneumatic cylinder 104 is pivotally coupled to the support arm 88 by a pivot linkage 108, and the second pneumatic cylinder 106 is pivotally coupled to the support arm 90 by a pivot linkage 109. In response to actuation of the pneumatic cylinders 104, 106, the power transfer arms are retracted. As the transfer arms retract, the inking/coating head 60 is rotated counterclockwise on the pivot shaft 77, thus moving the applicator roller 66 into coating engagement with the blanket cylinder 34.

The pivot linkage 108 includes a bell crank 111 which is mounted for pivotal movement on a pin 113. The pin 113 is supported by a clevis plate 115 which is attached to the support arm 88. One end of the bell crank is pivotally coupled to the actuator arm 104A, and a cam roller 117 is mounted for rotation on its opposite end.

The cam roller 117 is engagable against an adjustable stop 119 which is rigidly secured to the side plate 74. Counterclockwise shifting of the handle H moves a cam follower 121 into a latch pocket 123 of a receiver block 125 as the cam roller 117 is moved into engagement with the adjustable stop 119 in the interlocked, operative position. Referring to FIGURE 4, FIGURE 5 and FIGURE 6, the receiver block 125 is secured to the delivery side of the printing unit tower by machine screws.

When the plate P goes on impression, power is applied to the pneumatic actuator 104 and the power transfer arm 104A retracts, thus causing the bell crank 111 to rotate counterclockwise about the pin 113. The torque applied by the pneumatic actuator 104 is transmitted to the applicator head 60 through the cam roller 117 and the adjustable stop 119. Counterclockwise movement of the applicator head 60 relative to the support shaft 77 carries the applicator roller 66 into engagement with the plate P.

The adjustable stop 119 has a threaded bolt 119A which is engagable with the cam roller 117. The striking point of engagement is preset so that the applicator roller 66 is properly positioned for engagement with the plate P or blanket B in the operative position when the applicator head 60 is interlocked with the press frame 14 and the printing unit goes on impression.

Referring to FIGURE 5, an inking/coating apparatus 110 having a single head is illustrated. The construction of this alternative embodiment is identical in all respects with the dual head arrangement, with the exception that only a single gear train and a single cradle for holding the applicator roller is provided. In both embodiments, the inking/coating head 60 remains upright as it swings through an arc, comparable to the movement of a Ferris wheel. Because of the upright orientation of the inking/coating head 60 as it moves between the extended and retracted positions, the usual platform spacing between printing unit towers provides adequate clearance to permit extension and retraction of the carriage assembly 58 without interference with operator access to the printing units. This is a significant advantage in that it permits the in-line inking/coating apparatus 10 to operate effectively in the interstation space between any adjacent printing units, and without blocking or obstructing access to the cylinders of the printing units when the inking/coating apparatus is in the retracted position (as indicated in phantom in FIGURE 1).

Moreover, when the in-line inking/coating apparatus is in the fully retracted position, the applicator roller 66 is conveniently positioned on the dampener side of the printing unit for inspection, clean-up or replacement. Additionally, the doctor blade assembly is also conveniently positioned for inspection, removal, adjustment or clean-up. Also, the doctor blade reservoir and coating circulation lines can be cleaned while the press is running as well as when the press has been stopped for change-over from one type of ink or coating material to another.

When the inking/coating apparatus is used for applying an aqueous ink or an aqueous coating material, the water component on the freshly printed sheet S is evaporated by a high velocity, hot air interstation dryer and high volume heat and moisture extractor units 112 and 114, as shown in FIGURE 1, FIGURE 4 and FIGURE 5. The dryer/extractor units 112 and 114 are oriented to direct high velocity heated air onto the freshly printed/coated sheets as they are transferred by the interunit and the intermediate transfer cylinders 36, 40. By this arrangement, the freshly printed aqueous ink or coating material is completely dry before the sheet is overprinted in the next printing unit.

The high velocity, hot air dryer and high performance heat and moisture extractor units 112, 114 utilize high velocity air jets which scrub and break-up the moist air level which clings to the surface of each freshly printed sheet. Within each dryer, high velocity air is heated to a high temperature as it flows across a resistance heating element within an air delivery baffle tube. High velocity jets of hot air are discharged through multiple airflow apertures through an exposure zone Z (FIGURE 4 and FIGURE 5) onto the freshly printed/coated sheet S as it is transferred by the transfer cylinder 36 and intermediate transfer cylinder 40, respectively. Each dryer assembly includes a pair of air delivery dryer heads which are arranged in spaced, side-by-side relation as shown in FIGURE 4 and FIGURE 5.

The high velocity, hot moisture-laden air displaced from each freshly printed sheet is extracted from the dryer exposure zone Z and completely exhausted from the printing unit by the high volume extractors. Each extractor head includes a manifold coupled to the dryer heads and draws the moisture, volatiles and high velocity hot air through a longitudinal gap between the dryer heads. According to this arrangement, each printed sheet is dried before it is run through the next printing unit.

The water-based inks used in flexographic printing dry at a relatively moderate drying temperature provided by the interstation high velocity hot air dryers/extractors 112, 114. Consequently, print quality is substantially improved since the aqueous ink is dried at each printing unit before it enters the next printing unit. Moreover, back-trapping on the blanket of the next printing unit is completely eliminated. This interstation drying arrangement makes it possible to print aqueous inks such as metallic ink and opaque white ink at one printing unit, and then overprint at the next printing unit.

This arrangement also permits the first printing unit to be used as a coater in which an aqueous coating is applied to low grade paper, for example recycled paper, to trap and seal in lint, dust, spray powder and other debris and provide a smoother, durable surface that can be overprinted in the next printing unit. The first down coating seals the surface of the low grade, rough substrate and improves overprinted dot definition while preventing strike-through and show-through. A UV-curable protective and/or decorative coating can be applied over the first down overprinted (aqueous) coating in the last printing unit.

Preferably, the applicator roller 66 is constructed of metal or ceramic when it is used for applying a coating material to the blanket B on the cylinder 34. When the applicator roller 66 is applied to the plate, it is preferably constructed as an anilox roller having a resilient transfer surface for engaging a flexographic printing plate. Suitable resilient roller surface materials include Buna N synthetic rubber and EPDM (terpolymer elastomer).

It will be appreciated that the inking/coating apparatus 10 is capable of applying a wide range of ink types, including fluorescent (Day Glo), pearlescent, metallics (gold, silver and other metallics), glitter, scratch and sniff (micro-encapsulated fragrance), scratch and reveal, luminous, pressure-sensitive adhesives and the like.

The press operator can eliminate the dampener roller assembly altogether, and the inking/coating apparatus 10 can selectively apply aqueous inks and coatings to a flexographic or waterless printing plate and the blanket. Moreover, overprinting of the aqueous inks and coatings can be carried out in the next printing unit since the aqueous inks and coatings are completely dried by the high velocity, hot air interstation dryer and high volume heat and moisture extractor assembly.

The aqueous inks and coatings as used in the present invention contain colored pigments and/or soluble dyes, binders that fix the pigments onto the surface of the printed sheet, and waxes, defoamers and thickeners. Aqueous printing inks predominantly contain water as a solvent, diluent and/or vehicle. The thickeners which are preferred include algonates, starch, cellulose and its derivatives, for example cellulose esters or cellulose ethers and the like. Coloring agents including organic as well as inorganic pigments may be derived from dyes which are insoluble in water. Also, the printing ink may contain water and can be predominantly glycol or the like, with the pigment being bound by an appropriate resin. When metallic inks are printed, the cells of the anilox roller must be appropriately sized to prevent the metal particles from getting stuck within the cells. The cell size is critical, and for metallic gold ink, the anilox roller should have a screen line count in the range of 175-300 lines per inch (69-118 lines per cm).

The inking/coating apparatus 10 can also apply UV-curable inks and coatings. If UV-curable inks and coatings are utilized, ultra-violet dryers/extractors are installed adjacent the high velocity hot air dryer/extractor units 112, 114, respectively.

It will be appreciated that the inking/coating apparatus 10 described herein makes it possible to selectively operate a printing unit in either the flexographic printing mode or the lithographic printing mode, while also providing the capability to print or coat from either the plate or blanket position. The dual cradle support arrangement of the present invention makes it possible to quickly change over from inking/coating at the blanket

cylinder position to inking/coating at the plate cylinder position with minimum press down-time, since it is only necessary to remove and reposition or replace the applicator roller 66 while the printing/inking apparatus is in the retracted position.

Moreover, the press operator may elect to spot or overall coat with aqueous ink/coating from the plate during one job, and then spot and/or overall coat from the blanket during the next job. Since the doctor blade assembly can be flushed and washed-up quickly and the applicator roller can be replaced quickly, it is possible to spot coat or overall coat from the plate position or the blanket position with aqueous inks or coatings during the first press run and then spot coat or overall coat with UV-curable inks or coatings from the plate position or from the blanket position during the next press run. The inking/coating apparatus 10 is completely out of the way in the retracted position; consequently, the doctor blade reservoir and supply lines can be flushed and washed-up by automatic wash-up equipment while the printing unit is printing another job.

The positioning of the applicator head and roller assembly relative to the plate and blanket is repeatable to a predetermined, preset impression position. Consequently, no printing unit adjustment or alteration is required, except for flushing the doctor blade assembly and cleaning or replacing the applicator roller to accommodate a different kind of ink or coating material. Although manual extension and retraction have been described in connection with the exemplary embodiment, extension to the operative position and retraction to a non-operative idle position can be carried out automatically by hydraulic or electric motor servomechanisms.

The Ferris wheel support arrangement allows the inking/coating apparatus to operate effectively in the interstation space between any adjacent printing units, as well as on the first or last printing units of the press, without blocking or obstructing the interstation space or restricting operator access to the cylinders of any of the printing units.

Finally, because the inking/coating apparatus of the present invention is mounted on a printing unit tower and is extendable to the operative position without requiring adjustment or alteration of the printing unit cylinders, it can be used for applying printing ink or coating material to the blanket cylinder of a rotary offset web press, or to the blanket of a dedicated coating unit.

Claims

1. Inking/coating apparatus (10) for use in a printing press (12) of the type having a printing unit (22, 24, 26, 28) on which a plate cylinder (32), a blanket cylinder (34) and an impression cylinder (36) are mounted for rotation, wherein the inking/coating apparatus is characterized by:

   an applicator head (60) for applying ink or coating material to a plate (P) mounted on the plate cylinder or to a blanket (B) mounted on the blanket cylinder, either separately or simultaneously when the inking/coating apparatus is in an operative position relative to the plate and blanket cylinders; and,

   a carriage assembly (58) for moving the applicator head to the operative position in which the applicator head is disposed laterally adjacent to the plate and blanket cylinders and for moving the applicator head from the operative position to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

2. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) is characterized by:

   a support arm (88, 90) having a first end portion (88A) constructed for pivotal attachment to the printing unit and having a second end portion (88B) pivotally coupled to the applicator head (60), the applicator head being movable on the support arm to the operative position.

3. Inking/coating apparatus (10) as set forth in claim 1, characterized in that a counterweight (100, 102) is coupled to the carriage assembly.

4. Inking/coating apparatus (10) as set forth in claim 1, wherein the applicator head (60) is characterized by:

   a doctor blade assembly (68) having a reservoir (70) for receiving ink or liquid coating material; and,

   an applicator roller (66) coupled to the doctor blade assembly in fluid communication with the reservoir, the applicator roller being engagable with a printing plate (P) on the plate cylinder or with a blanket (B) on the blanket cylinder when the applicator head (60) is in the operative position.

5. Inking/coating apparatus (10) as set forth in claim 4, characterized in that the applicator roller (66) is an anilox roller having a resilient transfer surface.

6. Inking/coating apparatus (10) as set forth in claim 1, characterized in that:

   a power actuator (104, 106) is movably coupled to the applicator head (60), the power actuator having a power transfer arm (104A, 106A) which is extendable and retractable; and,

   movement converting apparatus (108) is coupled to the power transfer arm for converting

extension or retraction movement of the power transfer arm into pivotal movement of the applicator head (60) relative to the carriage assembly.

7. Inking/coating apparatus (10) as set forth in claim 6, wherein the movement converting apparatus (108) is characterized by:

a bell crank plate (111) having a first end portion coupled to the power transfer arm and having a second end portion for engaging a stop member;
a stop member (119) secured to the applicator head (60); and,
a clevis plate (115) secured to the carriage assembly (58) and pivotally coupled to the bell crank plate.

8. Inking/coating apparatus (10) as set forth in claim 1, wherein the applicator head (60) is characterized by:

first and second side frame members (74, 76) pivotally coupled to the carriage assembly (58);
a doctor blade assembly mounted on the first and second side frame members, the doctor blade assembly including a reservoir (70) for receiving ink or liquid coating material;
a cradle assembly (78, 80), (82, 84) mounted on the first and second side frame members, respectively;
an applicator roller (66) mounted for rotation on the cradle assembly and coupled to the doctor blade assembly for rolling contact with ink or coating material in the reservoir, the applicator roller being engagable with a printing plate (P) on the plate cylinder (32) or with a blanket (B) on the blanket cylinder (34) when the applicator head (60) is in the operative position; and,
a drive motor (62) coupled to the applicator roller for rotating the applicator roller.

9. Inking/coating apparatus (10) as set forth in claim 8, characterized in that:

the cradle assembly (79, 80) has first and second sockets (79, 81) disposed on the first and second side frame members respectively; and,
the applicator roller (66) is mounted for rotation on the first and second sockets.

10. Inking/coating apparatus (10) as set forth in claim 8, characterized in that

the cradle assembly (78, 80), (82, 84) includes first and second sockets (79, 81) disposed on the first and second side frame members, respectively, and third and fourth sockets disposed on the first and second side frame members, respectively; and,
the applicator roller (66) is selectively mountable for rotation on either the first and second sockets or on the third and fourth sockets for applying ink or coating material to either the plate or blanket when the applicator head is in the operative position.

11. Inking/coating apparatus (10) as set forth in claim 1, wherein the applicator head (60) is characterized by:

a first cradle (78, 80) for supporting an applicator roller (66) for engagement with the plate when the inking/coating apparatus is in the operative position; and
a second cradle (82, 84) for supporting an applicator roller (66) for engagement with the blanket (B) when the inking/coating apparatus is in the operative position.

12. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly is characterized by:

a support arm (88, 90) having a first end portion pivotally coupled to the printing unit (88A, 90A) and having a second end portion (88B, 90B);
a common pivot shaft (77) on which the support arm second end portion and the inking/coating apparatus are pivotally mounted; and,
male and female latch members (103, 105) coupled between the common pivot shaft and the printing unit, with one of the latch members being secured to the common pivot shaft and the other latch member being constructed for attachment onto the printing unit, the latch members being mateable in interlocking engagement when the applicator head (60) is in the operative position.

13. Inking/coating apparatus (10) as set forth in claim 1, wherein the applicator head (60) and the printing unit are characterized by:

male and female latch coupling members (103, 105) mounted on the carriage assembly (58) and on the printing unit for releasably latching the carriage assembly in interlocking engagement with the printing unit when the applicator head is in the operative position.

14. Inking/coating apparatus (10) as set forth in claim 1, wherein the carriage assembly (58) is characterized by an elongated shank portion (88B, 90B) and a hub portion (88A, 90A), the elongated shank portion being pivotally coupled to the applicator head

(60) and the hub portion being constructed for pivotal attachment onto the printing unit.

15. A rotary offset printing press (12) having first and second printing units (22, 24) and the inking/coating apparatus (10) of claim 1 is movably coupled to the first printing unit (22) as set forth in claim 1, characterized by:

a dryer (112) mounted on the first printing unit adjacent the impression cylinder (36) of the first printing unit for discharging heated air onto a freshly printed substrate while the freshly printed substrate is in contact with said impression cylinder.

16. A rotary offset printing press (12) as defined in claim 15, characterized in that:

an extractor (112E) is disposed adjacent the dryer for extracting hot air, moisture and volatiles from an exposure zone (Z) between the dryer and the freshly printed substrate.

17. A rotary offset printing press (12) as defined in claim 15, characterized in that:

an intermediate transfer cylinder (40) is coupled in sheet transfer relation with the impression cylinder (36) of the first printing unit (22); and,
an interstation dryer (114) is disposed adjacent the intermediate transfer cylinder for discharging heated air onto a freshly printed or coated substrate after it has been transferred from the impression cylinder of the first printing unit and while it is in contact with the intermediate transfer cylinder (40).

18. A method for rotary offset printing in a printing press (12) of the type including first and second rotary offset printing units (22, 24), and using aqueous or UV-curable printing ink or coating material in the operation of at least the first printing unit, characterized by the following steps performed at each printing unit in succession:

spot or overall coating a plate (P) with aqueous ink/aqueous coating material or UV-curable ink/UV-curable coating material;
spot and/or overall coating a blanket (B) with aqueous ink/aqueous coating material or UV-curable ink or UV-curable coating material;
transferring the printing ink or coating material from the printing plate (P) to the blanket (B);
transferring the inked or coated image from the blanket to a substrate (S) as the substrate is transferred through the nip between the impression cylinder (36) and the blanket (B); and,
drying the ink or coating material on the freshly printed substrate before the substrate is subsequently processed.

19. A method for rotary offset printing as defined in claim 18, wherein the drying step is characterized by:

discharging high velocity, heated air onto the freshly printed/coated substrate (S) while the freshly printed/coated substrate is in contact with the impression cylinder (36) of the first printing unit (22).

20. A method for rotary offset printing as defined in claim 18, characterized by the steps:

transferring the freshly printed substrate (S) from the first printing unit (22) to an intermediate transfer cylinder (40); and,
drying the freshly printed substrate while it is in contact with the intermediate transfer cylinder.

21. A method for rotary offset printing as defined in claim 18, characterized by the step:

extracting hot air, moisture and volatiles from an exposure zone (Z) above the freshly printed/coated substrate (S) while the freshly printed/coated substrate is in contact with the impression cylinder (36).

22. A method for rotary offset printing as defined in claim 18, characterized by the steps:

applying a primer coating of an aqueous coating material or UV-curable coating material to a substrate (S) in the first printing unit (22); and,
drying the primer coating on the substrate before the substrate is processed in the second printing unit.

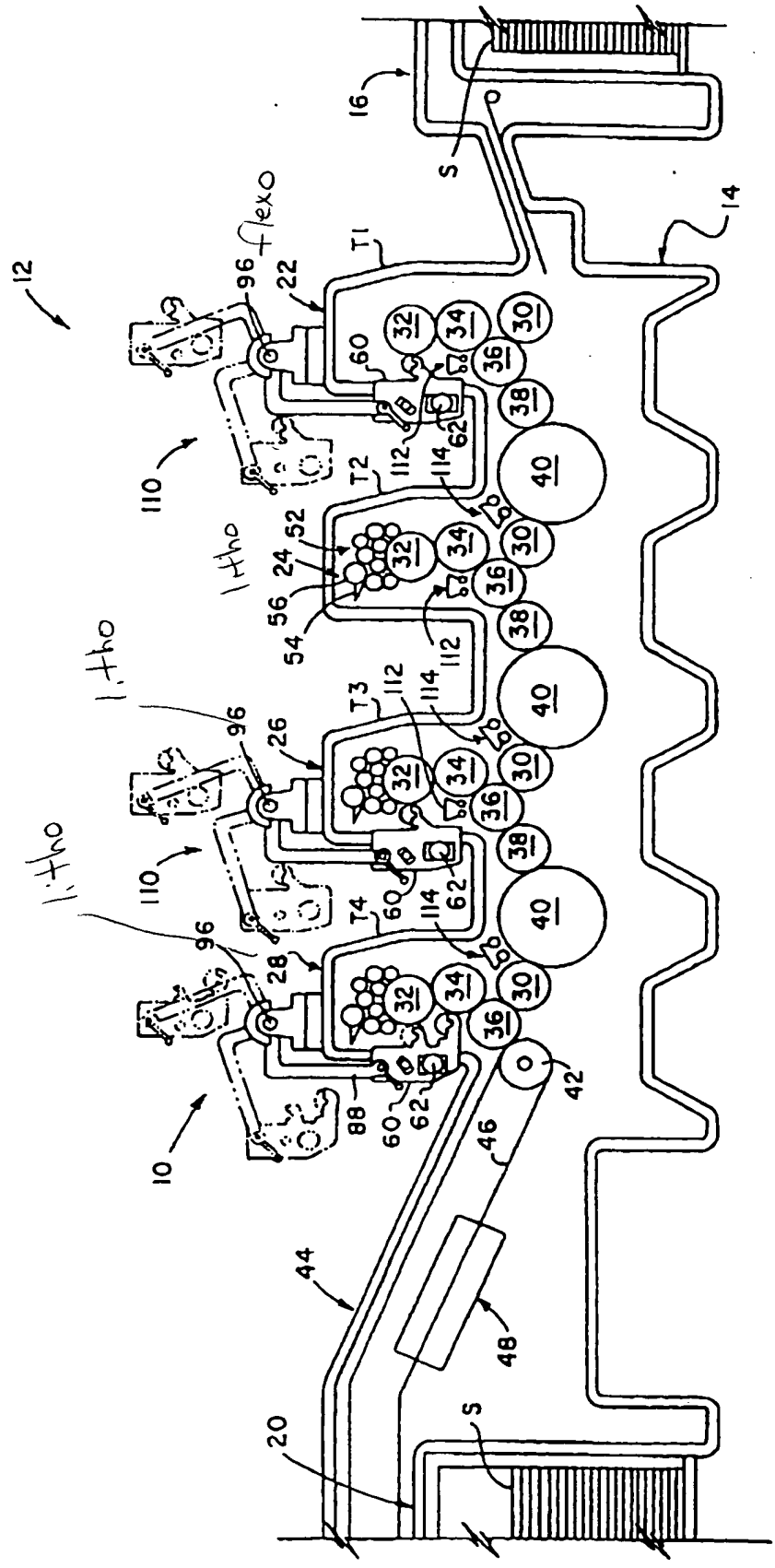
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FIG. 1

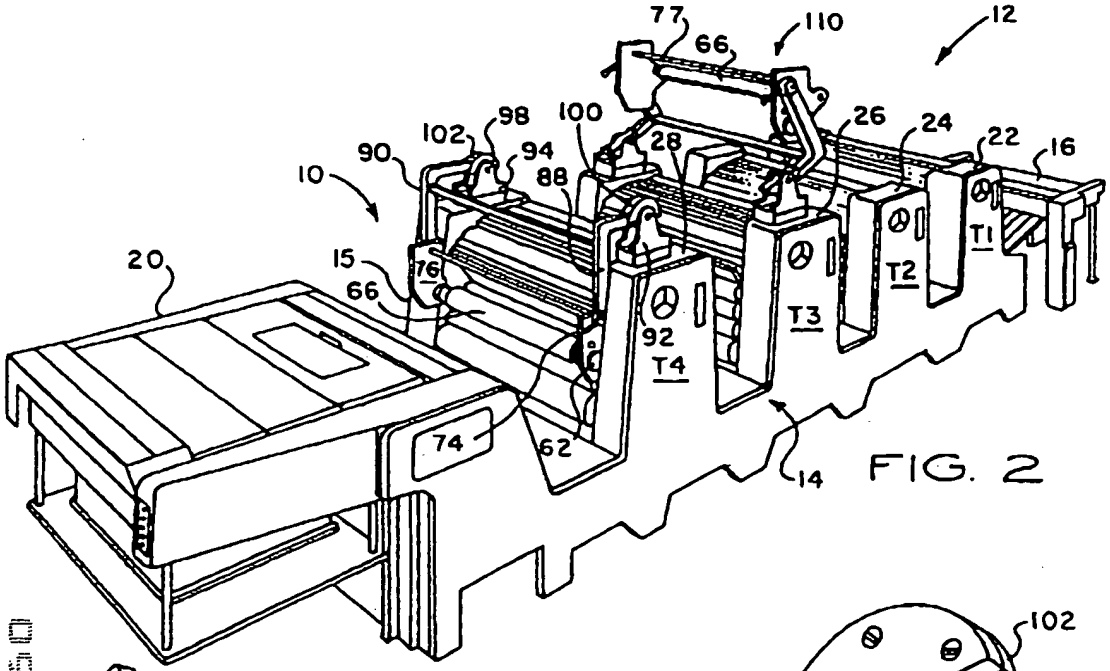
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FIG. 2

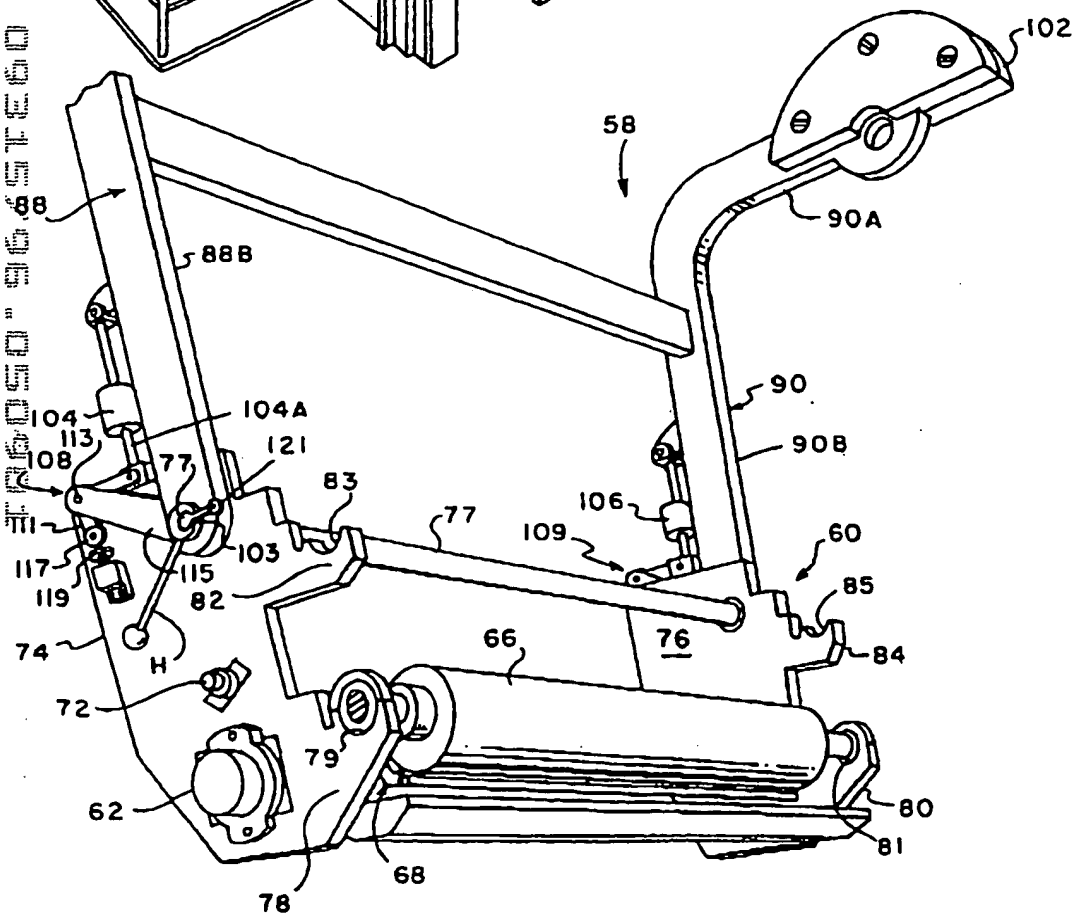
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FIG. 3

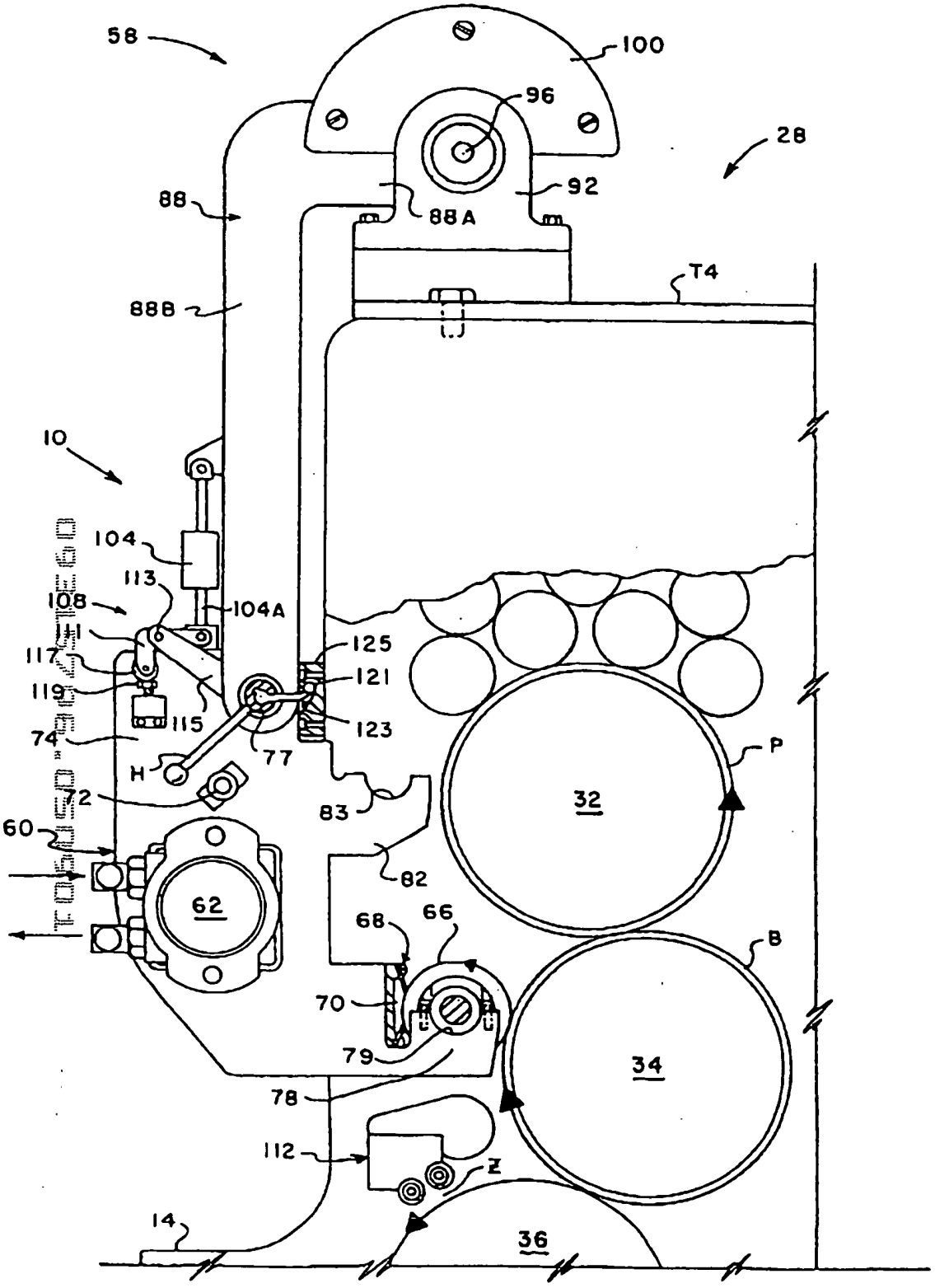
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FIG. 4

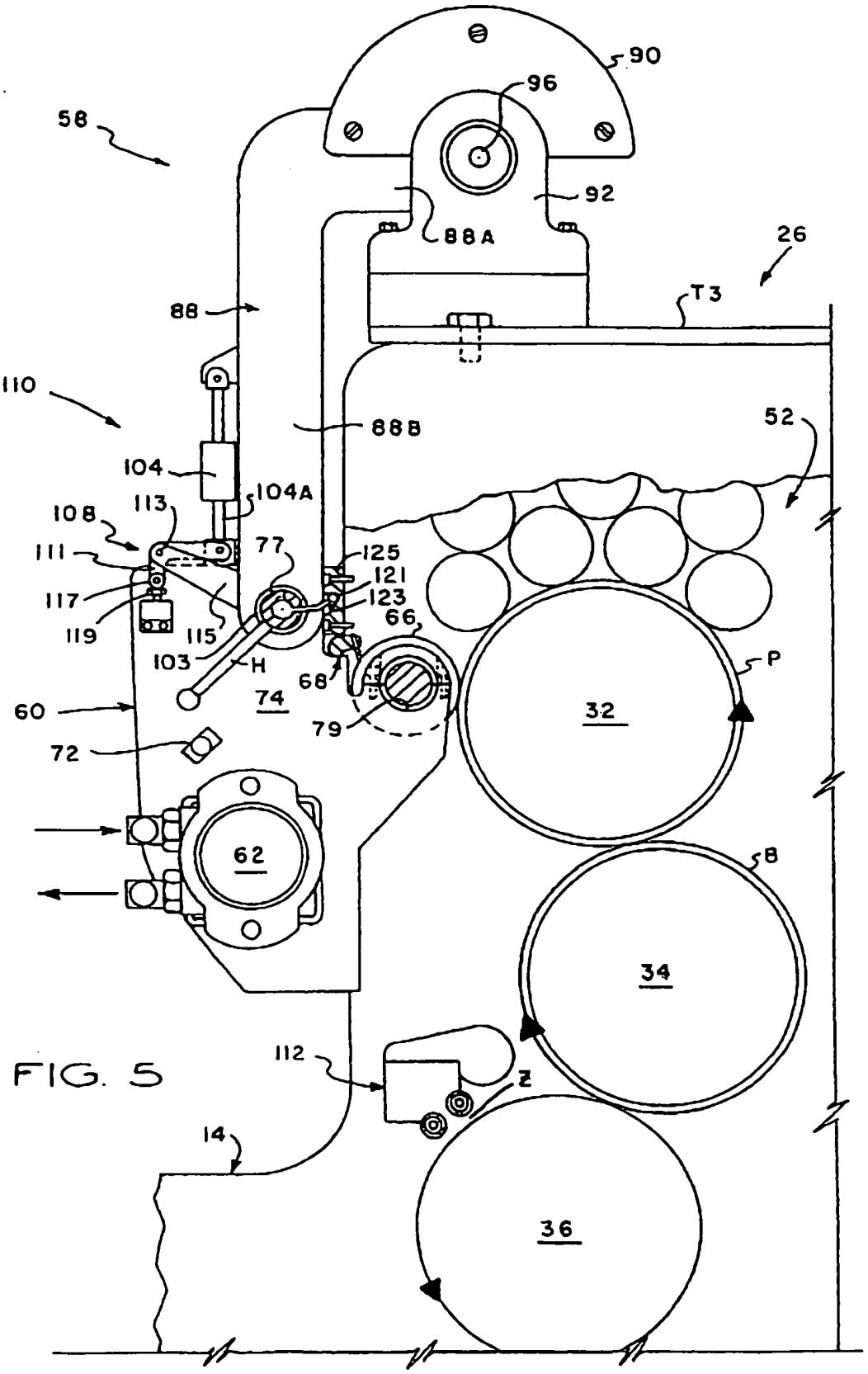
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FIG. 5

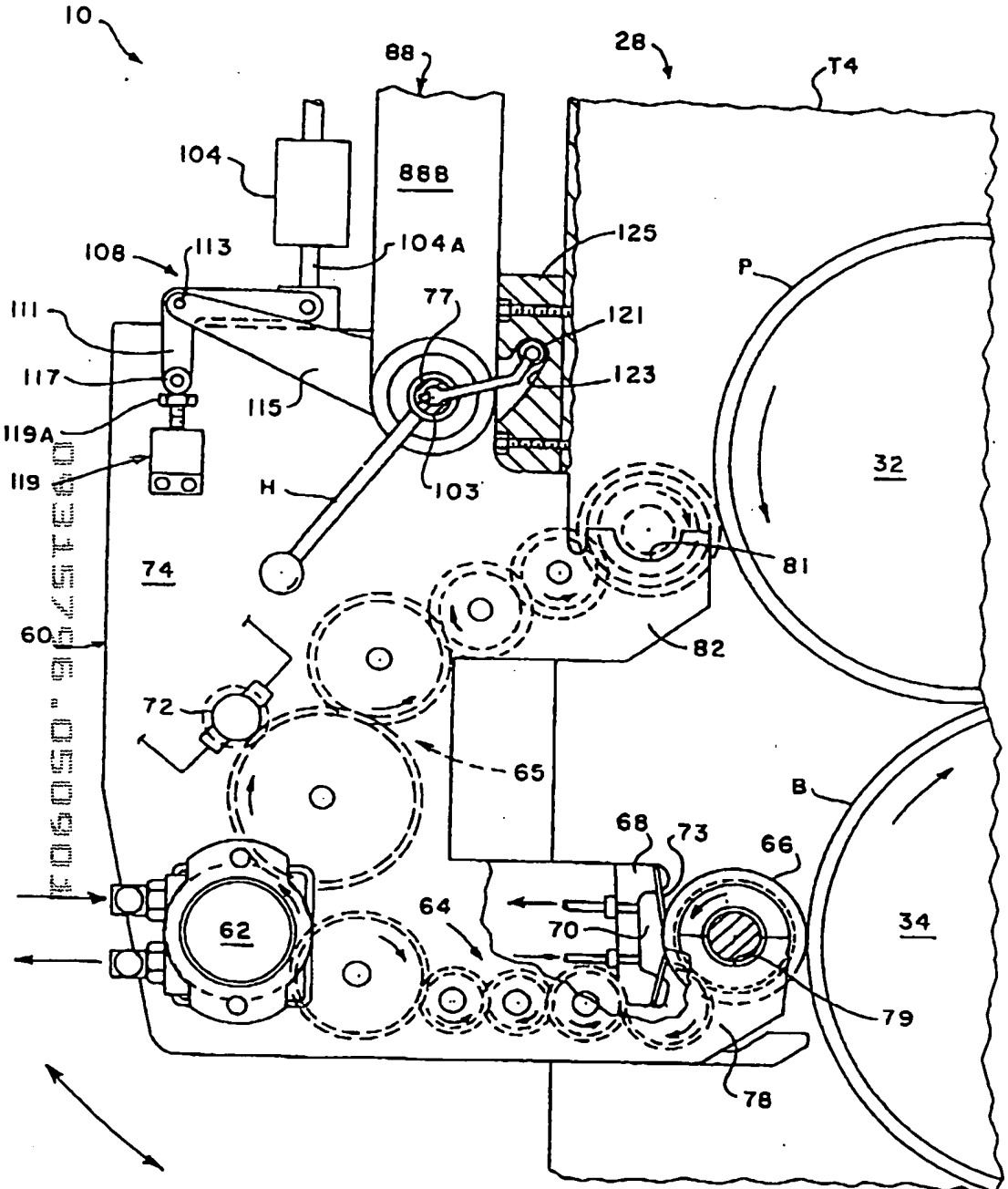
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FIG. 6

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(54) Retractable inking/coating apparatus having ferris movement between printing units

(57) A retractable in-line inking/coating apparatus (10) selectively applies either spot or overall ink/coating material to a blanket (B) or flexographic plate (P) on a blanket cylinder (34), or spot or overall ink/coating to a flexographic printing plate (P) on a plate cylinder (32) in a rotary offset printing press (12). The inking/coating apparatus is pivotally mounted on a printing unit (22, 24, 26, 28) or dedicated coating unit, and is extendable into and retractable out of an operative inking/coating position by a carriage assembly (58) which is pivotally coupled to the printing unit. Because of the pivotal support provided by a cantilevered support arm (88, 90), the inking/coating apparatus is extended and retracted through a Ferris wheel arc between adjacent printing units.

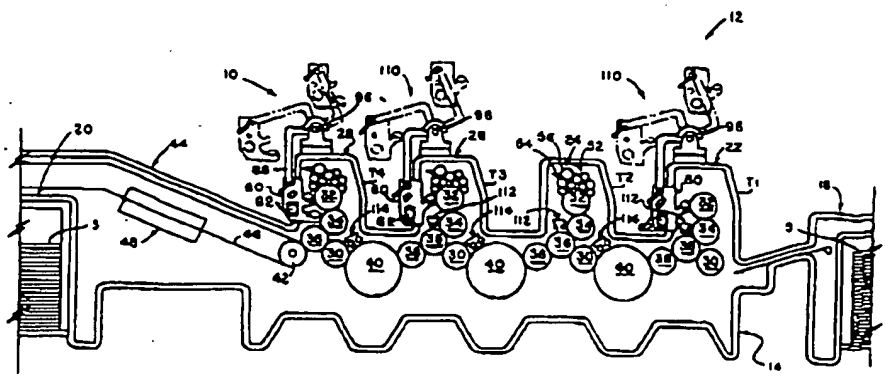

FIG. 1

EP 0 741 025 A3

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 3136

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US 4 841 903 A (BIRD) * abstract; claims; figure 1 *	1,15-17 4-6,8,9, 13	B41F31/30 B41F5/24 B41F23/08
X	US 5 107 790 A (SLIKER ET AL.) * abstract; claim 1; figures * * column 2, line 9 - line 22 *	1,18	
Y	US 5 335 596 A (DEMOORE ET AL.) * abstract; figures 1-4 * * column 7, line 32 - line 58 *	4,5,8,9	
Y	US 4 617 865 A (SWITALL) * abstract; figures 1-3 * * column 6, line 9 - line 42 *	6	
Y	US 4 825 804 A (DIRICO ET AL.) * abstract; figures 2,3 * * column 3, line 10 - line 21 *	13	
A	EP 0 647 524 A (DEMOORE) * abstract; figures 1,2,5 * * column 4, line 32 - line 40 *	15-22	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B41F
A	PAPIER + KUNSTSTOFF VERARBEITER, vol. 26, no. 6, 1 June 1991, page 129 XP000232825 "LACKIER-AGGREGAT FUER SPEEDMASTER-MASCHINEN"	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 March 1997	Helpiö, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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(54) High velocity, hot air dryer and extractor.

(57) A hot air dryer (10) utilizes high velocity air jets which scrub and break up the moist air layer which clings to the surface of a freshly printed sheet (S). High velocity air is heated to a high temperature as it flows along a resistance heating element (38) within an air delivery baffle tube (64). The heated, high velocity air pressurizes a plenum chamber (46) within an air distribution manifold (36W). High velocity jets of hot air are discharged through multiple airflow apertures (54) onto the wet ink side of a printed sheet as it moves through a dryer exposure zone (Z). An extractor (40) removes the moist air layer, high velocity hot air and volatiles from the printed sheet (S) and from the press (12).

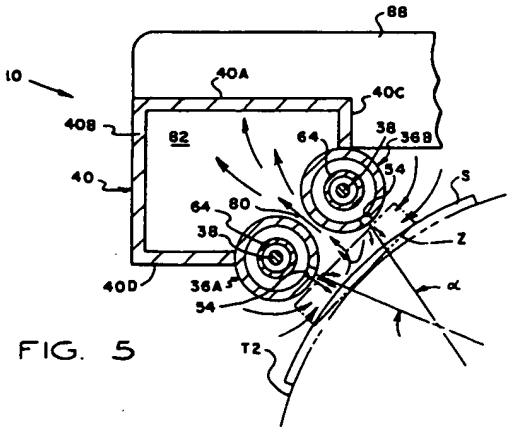


FIG. 5

EP 0 647 524 A1

This invention relates generally to accessories for sheet-fed, rotary offset and flexographic printing presses, and in particular to a dryer for printed materials which utilizes high velocity, hot air flow and extraction.

In the operation of a rotary offset press, an image is reproduced on a web or sheet of paper or some other printable substrate by a plate cylinder which carries the image, a blanket cylinder which has an ink transfer surface for receiving the inked image, and an impression cylinder which presses the paper against the blanket cylinder so that the inked image is transferred to the paper. In some applications, a protective and/or decorative coating is applied to the surface of the freshly printed sheets. The freshly printed sheets are then transported to a sheet delivery stacker in which the printed sheets are collected and stacked.

The relatively wet condition of the printing ink composition and its solvent and/or diluent components and a layer of moisture laden air which clings to the surface of the freshly printed web or sheet may interfere with the quality of the images as they are printed at each succeeding printing unit. For example, the quality of colored images, half-tone illustrations and the like undergo degradation in the uniformity of their appearance and color because of the presence of the wet ink, volatiles, and moisture within the printed substrate. Moreover, protective coatings will undergo dilution and surface degradation causing a dull finish if the underlying substrate is not dried sufficiently before the coating is applied.

Such defects, including uneven surface appearance of protective/decorative coatings, detract from the appearance of the underlying images or photographs, particularly in the case of multi-colored images or photographs. The defects are caused by residual volatile solvents, diluents, water and the like within the oleoresinous inks of the images, and the presence of moisture in the printed material, at the time that the next successive image is printed or the protective/decorative coating is applied. Because the defects are compounded as the printed material moves through successive printing units, it is desirable that curing and drying be initiated and volatiles and moisture laden air be extracted at each interstation position, as well as at the delivery position.

Hot air dryers and radiant heaters have been used as delivery dryers and as interstation dryers. Interstation dryers employing radiant heat lamps are best suited for slow to moderate press speeds in which the exposure time of each printed sheet to the radiant heat is long enough to initiate ink setting. For high speed press operation, for example, at 5,000 sheets or more per hour, there is not enough available space at the interstation position to install a radiant heater having sufficient number of heat lamps for adequate drying purposes.

As press speed is increased, the exposure time (the length of time that a printed sheet is exposed to the radiant heat) is reduced. Since the number of lamps is limited by the available interstation space, the output power of the radiant lamps has been increased to deliver more radiant energy at higher temperatures to the printed sheets in an effort to compensate for the reduction in exposure time. The increased operating temperatures of the high-powered radiant heat lamps cause significant heat transfer to the associated printing unit and other equipment mounted on the press frame, accelerated wear of bearings and alterations in the viscosities of the ink and coating, as well as upsetting the balance between dampening solution and ink. The heat build-up may also cause operator discomfort and injury.

To handle high speed press operations, an off-press heater has been utilized from which high velocity, heated air is conveyed through a thermally insulated supply duct to a discharge plenum which directs high velocity, heated air onto the printed stock as it moves across the interstation dryer position. Such off-press heaters have proven to be relatively inefficient because of excessive heat loss and pressure drop along the supply duct. Attempts to overcome the heat loss and pressure drop have resulted in substantially increased physical size of the heater equipment (blower fan and supply duct) along with a substantial increase in the electrical power dissipated by the off-press heater.

According to the present invention, a high efficiency hot air dryer utilizes an on-press heater for producing high velocity hot air flow for accelerating the setting of inks on a freshly printed substrate. The on-press heater includes a housing member having a sidewall defining a manifold air distribution or plenum chamber, with the sidewall being intersected by an airflow discharge port. An air delivery tube has an inlet port for receiving high velocity airflow and has a tubular sidewall disposed in the plenum chamber. An elongated heating element is disposed within the inner airflow passage of the air delivery tube. High velocity air is discharged into the air delivery tube in heat transfer contact along the length of the heating element.

Heated, high velocity air is discharged out of the air delivery tube into the plenum chamber of the housing member. Preferably, the high velocity air is supplied to the manifold plenum chamber through an inlet port having an inlet flow area which is greater than the outlet flow area of the hot air discharge port. By this arrangement, heated air will be supplied to the plenum chamber faster than it can be discharged, so that the heated air will be

compressed within the manifold plenum chamber. This assures that jets of hot air which are discharged through multiple outlet apertures are uniform in pressure and velocity along the length of the dryer head, so that the printed sheet is dried uniformly as it is transferred through the exposure zone of the dryer.

According to another aspect of the present invention, the moist air layer is displaced from the surface of the printed sheet by high-velocity hot air jets which scrub and break-up the moisture-laden air layer that adheres to the printed surface of the sheet. The high-velocity hot air jets create turbulence which overcomes the surface tension of the moisture and separates the moisture laden air from the surface of the printed material. The moisture vapor and volatiles become entrained in the forced air flow and are removed from the printing unit by a high volume extractor.

The scrubbing action of the high velocity hot air jets is improved by adjacent rows of multiple discharge apertures which are oriented to deliver a converging pattern of high velocity hot air jets into an exposure zone across the sheet travel path. The high velocity hot air jets are produced by a pair of elongated dryer heads in which high velocity air is heated by heat transfer contact with a resistance heating element within an air delivery baffle tube. Since the release of moisture and other volatiles from the ink and printed material occurs continuously in response to the absorption of thermal energy, the moisture laden air layer is displaced continuously from the printed sheet as the printed sheet travels through the dryer exposure zone in contact with the converging hot air jets.

According to another aspect of the invention, the moisture-laden air, volatiles and hot air completely exhausted from the printing unit by a high volume extractor. An extractor manifold is coupled to a pair of elongated dryer heads and draws the moisture-laden air, volatiles and high velocity hot air from the exposure zone through a longitudinal air gap between the dryer heads. According to this arrangement, the setting of ink on each printed sheet is initiated and accelerated before the sheet is run through the next printing unit.

Operational features and advantages of the present invention will be understood by those skilled in the art upon reading the detailed description which follows with reference to the attached drawings, wherein:

FIGURE 1 is a schematic side elevational view in which multiple dryers of the present invention are installed at interstation positions in a four color offset rotary printing press;

FIGURE 2 is a simplified side elevational view showing the dryer of the present invention installed in an interstation position between two printing units of FIGURE 1;

FIGURE 3 is a bottom plan view showing installation of the dryer assembly of FIGURE 2 in the interstation position;

FIGURE 4 is a perspective view of the interstation dryer shown in FIGURE 2;

FIGURE 5 is a sectional view of the improved dryer of the present invention taken along the line 5-5 of FIGURE 4;

FIGURE 6 is a longitudinal sectional view of the dryer assembly shown in FIGURE 2;

FIGURE 7 is a sectional view of the dryer assembly shown in FIGURE 2, taken along the line 7-7 of FIGURE 6;

FIGURE 8 is a perspective view of a resistance heating element used in the dryer of FIGURE 2;

FIGURE 9 is a perspective view similar to FIGURE 8, with the resistance heating element enclosed in a support sheath;

FIGURE 10 is a view similar to FIGURE 4 which illustrates an alternative embodiment of the dryer head in which the discharge port is formed by an elongated slot; and,

FIGURE 11 is a perspective view, partially broken away, of the dryer head shown in FIGURE 10.

As used herein, the term "processed" refers to various printing processes which may be applied to either side of a sheet, including the application of inks and/or coatings. The term "substrate" refers to sheet material or web material.

Referring now to FIGURE 1, the high velocity hot air dryer 10 of the present invention will be described as used for drying freshly printed substrates, which are successively printed at multiple printing units in a sheet-fed, rotary offset printing press. In the exemplary embodiment, the dryer 10 of the present invention is installed at an interstation position between two printing units of a four color printing press 12 which is capable of handling individual printed sheets having a width of the approximately 40" (102 millimeters) and capable of printing 10,000 sheets per hour or more, such as that manufactured by Heidelberg Druckmaschinen AG of Germany under its designation Heidelberg Speedmaster 102V.

The press 12 includes a press frame 14 coupled on the right end to a sheet feeder 16 from which sheets, herein designated S, are individually and sequentially fed into the press, and at the opposite end, with a sheet stacker 18 in which the printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet stacker 18 are four substantially identical sheet printing units 20A, 20B, 20C and 20D which can print different color inks onto the sheets as they are moved through the press.

As illustrated in FIGURE 1, each sheet fed printing unit is of conventional design, each unit including a plate cylinder 22, a blanket cylinder 24 and an impression cylinder 26. Freshly printed sheets S from the impression cylinder 26 are transferred to the next printing unit by transfer cylinders T1, T2, T3. A protective coating may be applied to the printed sheets by a coating unit 28 which is positioned adjacent to the last printing unit 20D.

The freshly printed and coated sheets S are transported to the sheet stacker 18 by a delivery conveyor system, generally designated 30. The delivery conveyor 30 is of conventional design and includes a pair of endless delivery gripper chains 32 carrying laterally disposed gripper bars having a gripper element for gripping the leading edge of a freshly printed sheet S as it leaves the impression cylinder 26. As the leading edge of the printed sheet S is gripped by the grippers, the delivery chains 32 pull the gripper bar and sheet S away from the impression cylinder 26 and transports the freshly printed and/or coated sheet to the sheet stacker 18.

Prior to delivery, the freshly printed sheets S pass through a delivery dryer 34 which includes a combination of infra-red thermal radiation, forced air flow and extraction.

Referring now to FIGURE 2, FIGURE 5 and FIGURE 6, the interstation dryer 10 includes as its principal components a dryer head 36, a resistance heating element 38, and an extractor head 40. As shown in FIGURE 3, the dryer head 36 is mounted on the press side frame members 14A, 14B by side frame flanges 42, 44. In this interstation position, the dryer head 36 is extended laterally across and radially spaced from the interstation transfer cylinder T2, thereby defining an exposure zone Z.

The dryer head 36 includes a tubular sidewall 36W which encloses an air distribution manifold chamber 46. The air distribution manifold housing is sealed on opposite ends by end plates 48, 50, respectively, and is sealed against the extractor head 40. The manifold housing has an inlet port 52 for admitting high velocity, pressurized air through a supply duct 52 from an off-press compressor 53, and has a discharge port for delivering pressurized hot air into the exposure zone Z.

As shown in FIGURE 6, the air distribution manifold sidewall 36W is intersected by multiple discharge apertures 54 which collectively define the discharge port. The apertures 54 are oriented for discharging pressurized jets of high velocity, hot air toward the interstation transfer cylinder T2, and are longitudinally spaced along the dryer head 36. According to this arrangement, pressurized air jets are directed along a straight line across the printed side of a sheet S as it moves through the dryer exposure zone Z. In an alternative embodiment, as shown in FIGURE 10 and FIGURE 11, the discharge port is formed by an elongated slot 55 which intersects the dryer head sidewall 36W and extends longitudinally along the dryer head.

Referring now to FIGURE 6 and FIGURE 7, the resistance heating element 38 is coupled to the dryer head 36 by and end block 56. The end block 56 has a body portion which is intersected by an axial bore 58, a counterbore 60 and a radial inlet bore 62 which communicates with the counterbore. The heating element 38 has an end portion 38A which projects through the axial bore 58 and counterbore 60, with the elongated body portion of the heating element 38 extending into the plenum chamber 46.

According to an important feature of the present invention, the plenum chamber 46 is partitioned by an elongated air delivery baffle tube 64 which extends substantially the entire length of the dryer head 36. The air delivery baffle tube 64 has an inlet port 66 for receiving high velocity airflow from a remote supply and has a tubular sidewall 64A extending through the plenum chamber. The tubular sidewall 64A has an inner airflow passage 68 which connects the inlet port 66 in airflow communication with the plenum chamber 46 through its open end 64E. The air delivery baffle tube 64 has an end portion 64B projecting through the axial bore 60 of the end block 56, with its inner airflow passage 66 in airflow registration with the radial bore 62.

A pneumatic connector 70 is coupled to the radial inlet bore 62 of the end block 56 for connecting the inner airflow passage 68 to an off-press source of high velocity air. The end block 56 is sealed against the end plate 50, the tubular sheath 78 and against the pneumatic connector 70. High velocity, pressurized air is constrained to flow from the air duct 52 into the airflow passage 68 where it is discharged into the air distribution plenum chamber 46 after absorbing heat from the heating element 38.

As shown in FIGURE 6, the high velocity air flows longitudinally through the annular flow passage 68 in heat transfer contact with the heating element 38. The high velocity air is heated to a high temperature, for example 350°F (176°C), before it is discharged through the airflow apertures 54.

To provide uniform air jet discharge through the apertures 54, the inlet area of the inlet port 66 should be greater than the combined outlet area provided by the multiple airflow discharge apertures 54. In the preferred embodiment, the discharge apertures 54 have a diameter of 1/16 inch (0.158 cm), and for a 40" (102 mm) press there are 88 apertures spaced apart along the dryer head 36 on 0.446 inch (1.13 cm) centers. This yields a total

airflow outlet area of 0.269 square inch (1.735 square cm). Preferably, the effective inlet area of the inlet port 66 is at least about 0.54 square inch (3.484 square cm).

In the alternative dryer head embodiment shown in FIGURE 10, the air discharge slot 55 has a length of 40 inches (102 mm) along its longitudinal dimension L, and has an arc length C of 6.725 mils (17×10^{-3} cm).

With the preferred inlet/outlet ratio of about 2:1 or more, the high velocity, heated air will be supplied to the plenum chamber 46 faster than it can be discharged, so that the heated air will be compressed within the manifold plenum chamber. This assures that the jets of hot air which are discharged through the outlet apertures 54 are uniform in pressure and velocity along the length of the dryer head, so that the printed sheet is dried uniformly as it is transferred through the exposure zone Z.

The air distribution baffle tube 64 is supported on the inlet end by the end plate 50, and on its discharge end by flange segments 64F which engage the internal bore of the dryer head 36 and positions the baffle tube in the center of the plenum chamber 46.

Referring now to FIGURE 6, FIGURE 7, FIGURE 8 and FIGURE 9, the heating element 38 is preferably an electrical resistance heater having elongated resistance heater sections 38C, 38D which are integrally formed and folded together about at a common end 38E. The resistance sections 38C, 38D are substantially co-extensive in length with the air delivery baffle tube 64. Each section 38C, 38D is electrically connected to a power conductor 72, 74, respectively, for connecting the resistance heating element 38 to an off-press source of electrical power.

The resistance heater sections 38C, 38D are mechanically stabilized by an end connector 76, and are enclosed within a tubular, thermally conductive sheath 78. Radial expansion of the half sections 38C, 38D is limited by the sidewall of the sheath 78, thus assuring efficient heat transfer, while the sheath provides longitudinal support for the elongated resistance heater sections within the inner airflow passage 68. The heating element half-sections 38C, 38D thus form a continuous loop resistance heating circuit which is energized through the power conductors 72, 74.

The tubular sheath 78 is received within the bore 58 and is welded to the end block 56. The tubular sheath 78 thus provides an opening through the end block 56 to permit insertion and withdrawal of the heating element 38 for replacement purposes. The heating element 38 is dimensioned for a sliding fit within the sheath 78 at ambient temperature. The end cap 76 is releasably secured to the end block 56 by a hold-down metal strap (not illustrated). The distal end 78B of the sheath is sealed by an end cap 78C to prevent leakage of high velocity air out of the distribution manifold chamber 46.

Referring now to FIGURE 2, FIGURE 4, and FIGURE 5, the extractor head 40 is coupled to the back side of a pair of identical dryer heads 36A, 36B. The dryer heads 36A, 36B are separated by a longitudinal air gap 80 which opens in air flow communication with an extractor manifold chamber 82, thereby defining a manifold inlet port. The extractor manifold chamber 82 is enclosed by the end plates 48, 50 and by housing panels 40A, 40B, 40C and 40D. The extractor housing panels 40C, 40D are secured and sealed by a welded union to the dryer heads 36A, 36B.

According to another aspect of the present invention, the multiple air flow apertures 54 of each dryer head 36A, 36B are arranged in linear rows R1, R2, respectively, and extend transversely with respect to the direction of sheet travel as indicate by the arrows S in FIGURE 3. The rows R1, R2 are longitudinally spaced with respect to each other along the sheet travel path. Each air jet expands in a conical pattern as it emerges from the airflow aperture 54. Expanding air jets from adjacent rows intermix within the exposure zone Z, thereby producing turbulent movement of high velocity hot air which scrubs the processed side of the sheet S as it moves through the exposure zone Z. Preferably, balanced air pressure is applied uniformly across the exposure zone Z to ensure that the moist air layer is completely separated and extracted from the freshly printed sheets.

In the exemplary embodiment, the pressure of the high velocity air as it is discharged through the inlet port 66 into the heat transfer passage 68 is about 10 psi (7031 Kgs/m^2). The inlet suction pressure in the longitudinal air gap 80 of the extractor is preferably about 5 inches of water (12.7×10^3 Kgs/cm^3).

As shown in FIGURE 3 and FIGURE 5, the extractor manifold inlet port 80 is coupled in air flow communication with the exposure zone Z for extracting heat, moisture laden air and volatiles out of the dryer. The extractor manifold chamber 82 is coupled in air flow communication with an exhaust fan 84 by an air duct 86. The air duct 86 is coupled to the extractor manifold chamber 82 by a transition duct fitting 88.

The high velocity, heated air which is discharged onto the printed sheet S is also extracted along with the moisture and volatiles through the air gap 80 into the extractor chamber 82. Ambient air, as indicated by the curved arrows, is also suctioned into the exposure zone Z and through the longitudinal air gap, thus assuring that hone of

the hot air, moisture or volatiles will escape into the press area. Extraction from the exposure zone Z is enhanced by directing the hot air jets along converging lines whose intersection defines an acute angle alpha (α), as shown in FIGURE 5.

The air flow capacity of the exhaust fan 84 is preferably about four times the total airflow input to the dryer heads. This will ensure that the exposure zone Z is maintained at a pressure level less than atmospheric thereby preventing the escape of hot air, moisture laden air and volatiles into the press room.

Claims

1. A hot air dryer (10) for installation in a printing press (12), said dryer comprising a dryer head (36) having a housing member (36W) defining an air distribution chamber (46), the housing member having an airflow inlet port (52) for receiving high velocity air and an airflow discharge port (54, 55) for directing heated air onto a substrate (S), and including a heating element (38) disposed in the air distribution chamber, characterized in that:

   an air delivery tube (64) is disposed in the air distribution chamber, the air delivery tube having an elongated airflow passage (68) connecting the inlet port in airflow communication with the air distribution chamber; and

   the heating element (38) is disposed within the elongated airflow passage (68) of the air delivery tube (64).

2. A hot air dryer (10) as defined in claim 1, characterized in that:

   pneumatic connector means (70) are coupled to the air delivery tube (64) for connecting the elongated air flow passage (68) to a source of high velocity air.

3. A hot air dryer (10) as defined in claim 1 or claim 2, characterised in that:

   electrical conductors (72, 74) are coupled to the heating element (38) for connecting the heating element to a source of electrical power.

4. A hot air dryer (10) as defined in any one of claims 1 to 3, characterized in that:

   an end block (56) is coupled to the housing member (36) and to the air delivery tube (64) for sealing the interface between the air delivery tube and the housing member.

5. A hot air dryer (10) as defined in any one of claims 1 to, characterised in that:

   an end block (56) is coupled to the housing member (36), the end block having a body portion intersected by an axial bore (58), a counterbore (60) and a radial inlet bore (62) communicating with the counterbore;

   the heating element (38) having an end portion (38A) projecting through the axial bore and counterbore; and,

   the air delivery tube (64) having an end portion (64B) disposed in the counterbore (60) with its elongated airflow passage (68) being coupled in airflow communication with the radial inlet bore (62).

6. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

   the elongated heating element (38) comprises an electrical resistance heater (38C, 38D).

7. A hot air dryer (10) as defined in claim 6, characterized in that:

   the heating element (38) has first and second resistance heater sections (38C,38D), the sections being joined at a common end (38E) and disposed in side-by-side relation.

8. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

   a tubular, thermally conductive sheath (78) is disposed within the elongated airflow passage (68); and,

   the heating element (38) is disposed within the sheath.

9. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

   an extractor head (40) is coupled to the dryer head (36), the extractor head including a housing member (40A, 40B, 40C, 40D) defining an extractor manifold chamber (82), the extractor head having an elongated inlet port (80) for extracting air from a dryer exposure zone Z into the extractor manifold chamber, and having discharge means (84, 86, 88) coupled to the extractor head for exhausting air from the extractor manifold chamber.

10. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

    the airflow discharge port (54) comprises multiple airflow apertures.

11. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

    the air discharge port (54) comprises an elongated slot (55).

12. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

the dryer head (36) is adapted for installation in an interstation position between adjacent printing press units (20A, 20B, 20C, 20D, 18) of a printing press (12), with the airflow discharge port (54, 55) facing the processed side of a substrate (S) as it is transported along a substrate travel path.

13. A hot air dryer (10) as defined in any one of the preceding claims, characterized in that:

the dryer (10) includes a second dryer head (36B) disposed in side-by-side relation with the first dryer head (36A) in a position facing the freshly processed side of a substrate (S) as it moves through a dryer exposure zone (Z) along a substrate travel path, the second dryer head (36B) having a housing member (36W) defining a second air distribution chamber (46), the housing member of the second dryer head including an inlet port (52) for receiving high velocity air and a discharge port (54, 55) oriented for directing heated air toward the sheet travel path, with the dryer heads being separated from each other by a longitudinal air gap (80); and,

an extractor head (40) is coupled to the dryer heads (36A, 36B), the extractor head including a housing member (40A, 40B, 40C, 40D) defining an extractor manifold chamber (82) and coupled in air flow communication with the longitudinal air gap (80), and having discharge means (84, 86, 88) coupled in air flow communication with the housing member for exhausting air from the extractor manifold chamber (82).

14. A hot air dryer (10) as defined in claim 13, characterized in that:

the discharge ports (54, 55) of the dryer heads are arranged in first and second rows (R1, R2), respectively, the rows being separated from each other along the substrate travel path, wherein heated air discharged from the discharge ports intermix with each other in the dryer exposure zone (Z).

15. A hot air dryer (10) as defined in claim 13 or claim 14, characterised in that:

the discharge ports (54, 55) of the first and second dryer heads are oriented for directing heated air along first and second converging lines (FIGURE 5), respectively.

16. A method for drying a freshly processed substrate (S) in a printing press (12) characterized by the steps:

directing high velocity air through an air delivery tube (64) which is disposed within an air distribution chamber (46);

heating high velocity air flowing through the air delivery tube by heat transfer contact with an elongated heating element (38) disposed within the air delivery tube; and,

discharging heated air from the air distribution chamber onto the freshly processed substrate (S).

17. A method for drying a freshly processed substrate (S) as defined in claim 16, characterized by the step:

compressing the heated air in the air distribution chamber (46) before the heated air is discharged.

18. A method for drying a freshly processed substrate (S) as defined in claim 16 or claim 17, characterised by the steps:

discharging heated air from the air distribution chamber (46) through an outlet port (54, 55); and

supplying the high velocity air to the air distribution chamber (46) through an inlet port (52) having an inlet flow area which is greater than the outlet flow area of the outlet port.

19. A method for drying a freshly processed substrate (S) as defined in any one of claims 16 to 18, characterised by the steps:

discharging jets of heated air from the air distribution chamber (46) through first and second rows (R1, R2) of outlet apertures (54, 55); and

intermixing air jets from the first and second rows in an exposure zone (Z).

20. A method for drying a freshly processed substrate (S) as defined in any one of claims 16 to 18, characterized by the steps:

discharging jets of heated, pressurized air from the air distribution chamber (46) through first and second rows (R1, R2) of outlet apertures; and

directing air jets discharged from air flow apertures of the first and second rows (R1, R2) along first and second converging lines (FIGURE 5), respectively.

21. A method for drying a freshly processed substrate (S) as defined in any one of claims 16 to 20, characterised by the steps:

installing first and second dryer heads (36A, 36B) in side-by-side relation on a printing press (12) in a position facing the processed side of a freshly processed substrate as it

travels through a dryer exposure zone (Z), the dryer heads being separated from each other by a longitudinal air gap (80);

supplying high velocity air to each dryer head (36A, 36B) through first and second air delivery tubes (64) which are disposed within an air distribution chamber (46) in each dryer head, respectively;

heating high velocity air flowing through each air delivery tube (64) by heat transfer contact with an elongated heating element (38) disposed within each air delivery tube;

discharging heated air from each dryer head through the dryer exposure zone (Z) and onto the freshly processed substrate (S); and

extracting air from the exposure zone (Z) through the longitudinal air gap (80).

22. A method for drying a freshly processed substrate (S) as defined in claim 21, characterized by the steps:

discharging heated air from each dryer head (36A, 36B) through an airflow outlet aperture (54, 55); and

supplying high velocity air to each dryer head through an inlet port (52) having an effective inlet flow area which is greater than the combined outlet flow areas of the air flow outlet apertures (54, 55).

23. A method for drying a freshly processed substrate (S) as defined in claim 21, or claim 22, characterised by the steps:

discharging jets of heated air from the first and second dryer heads (36A, 36B) through first and second rows (R1, R2) of outlet apertures (54, 55), respectively; and

intermixing air jets from the first and second rows in the exposure zone (Z).

24. A method for drying a freshly printed substrate (S) as defined in any one of claims 21 to 23, characterized by the steps:

discharging jets of heated air from the first and second dryer heads (36A, 36B) through first and second rows (R1, R2) of outlet apertures (54, 55), respectively; and

directing air jets discharged from air flow apertures of the first and second rows (R1, R2) along first and second converging lines (FIGURE 5), respectively.

25. A method for drying a freshly processed substrate (S) as defined in any one of claims 21 to 24, characterised by the step:

extracting air from the exposure zone (Z) at a volume flow rate through the longitudinal air gap (80) which exceeds the total volume flow rate of air discharged from the first and second dryer heads (36A, 36B).

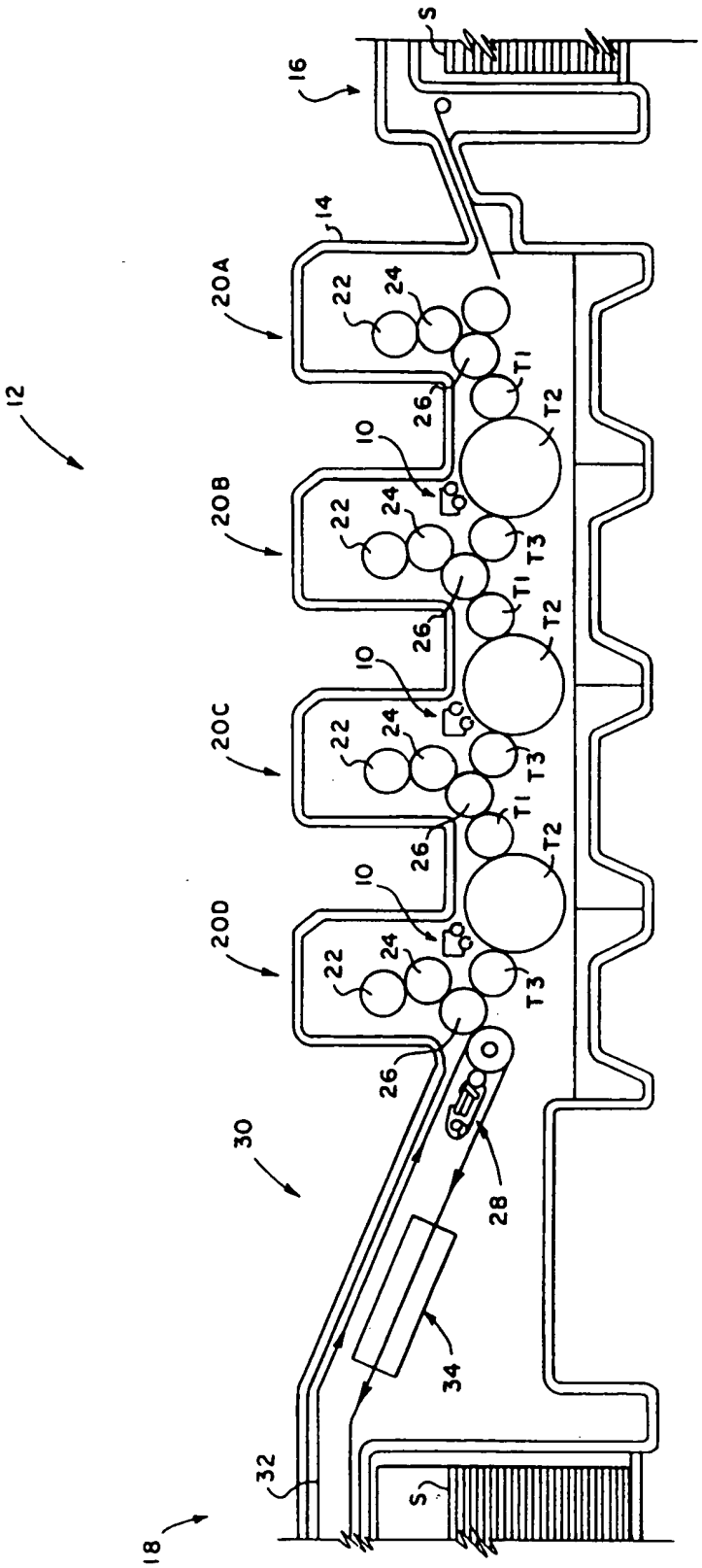


FIG. 1

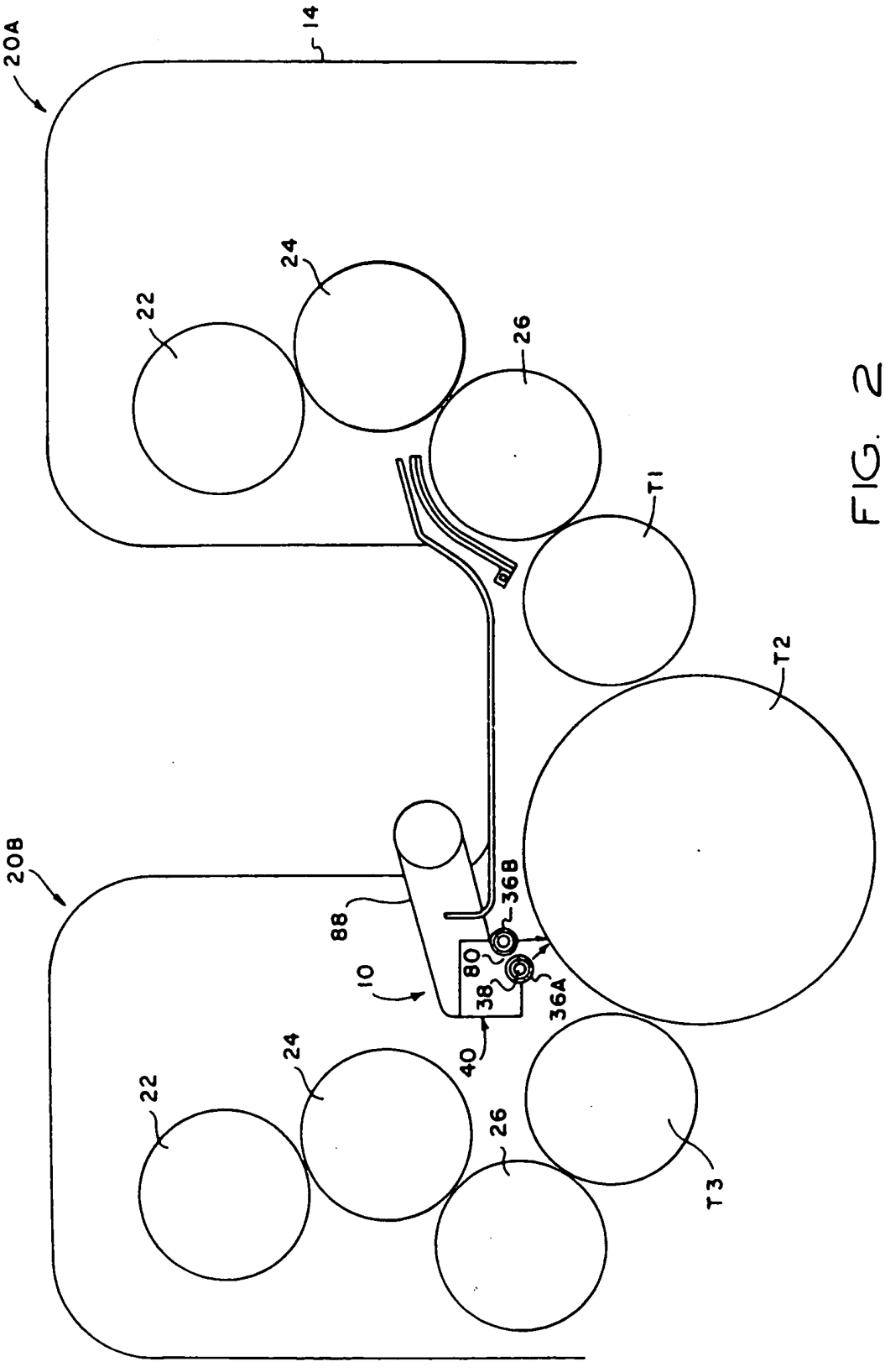


FIG. 2

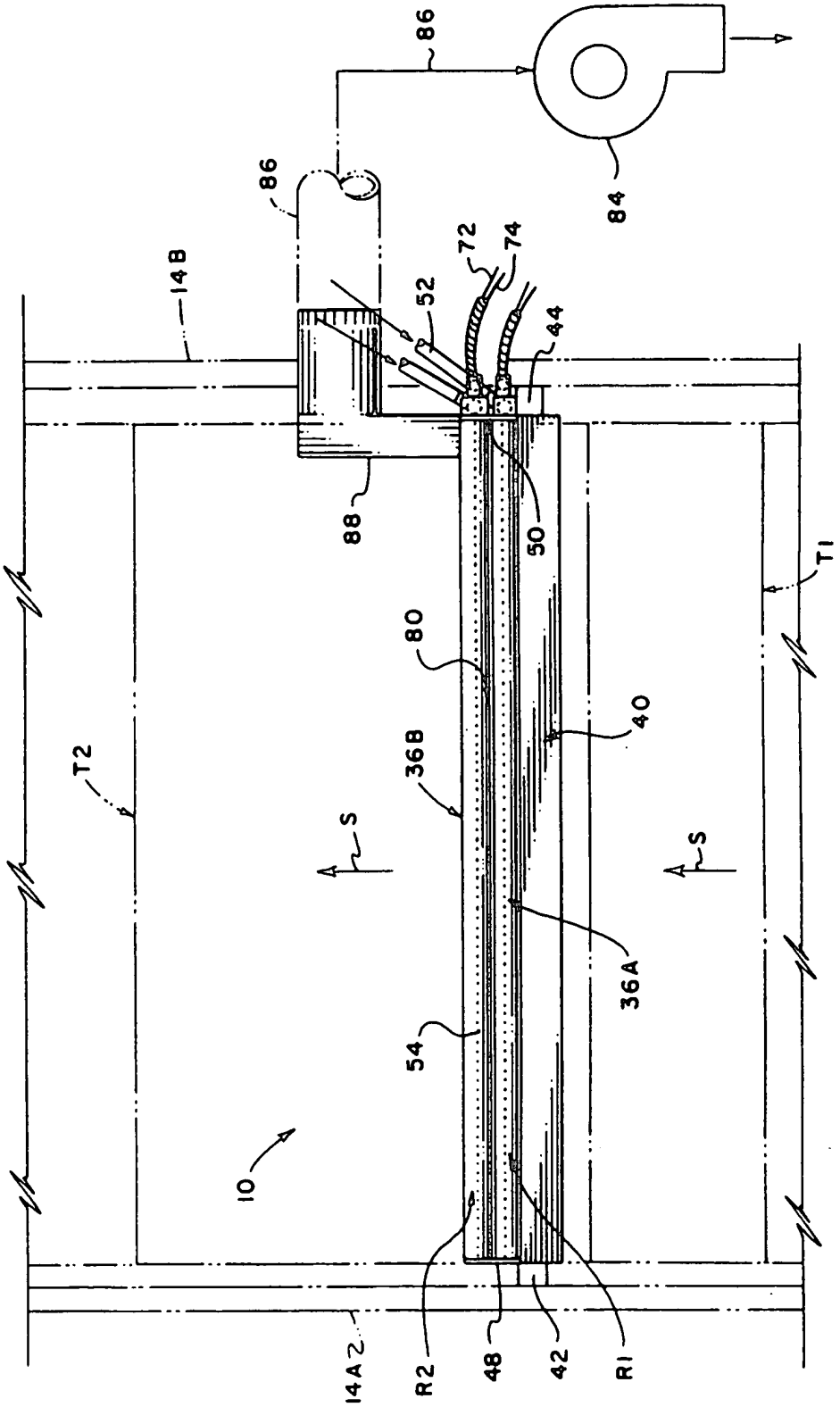

86
86
84
72
74
52
44
148
88
50
T1
80
40
T2
368
S
S
36A
54
10
14A
R2
48
42
R1

FIG. 3

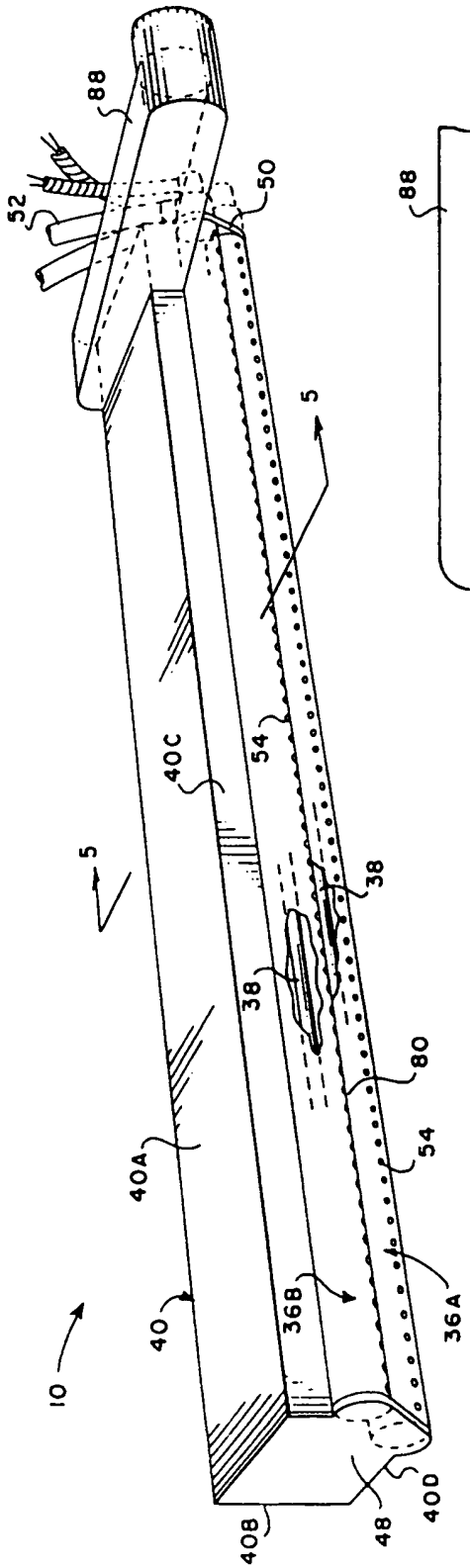

88
52
50
5
5
40C
54
38
38
80
54
40A
40
368
36A
10
48
400
408

FIG. 4

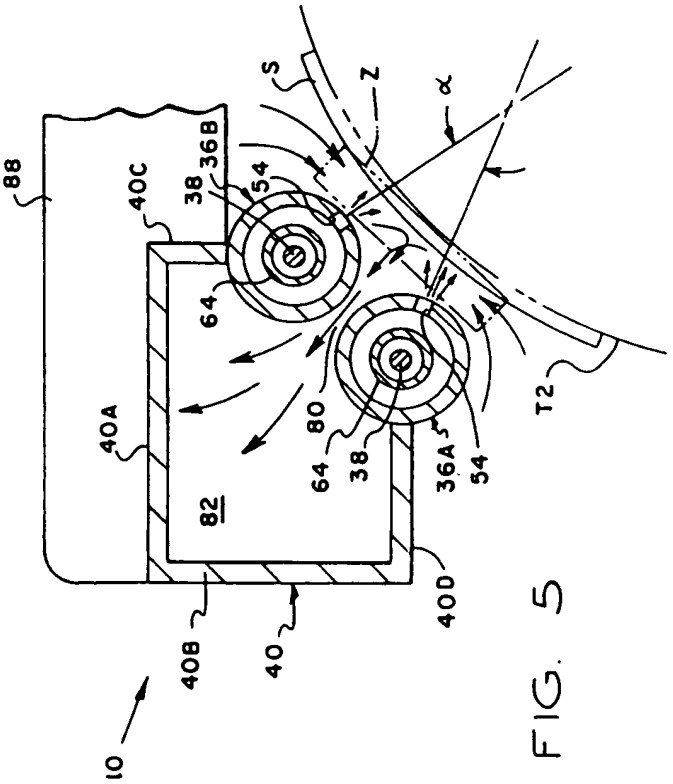

88
40C
38
368
54
64
40A
82
64
80
38
36A
54
400
408
40
10
S
Z
α
T2

FIG. 5

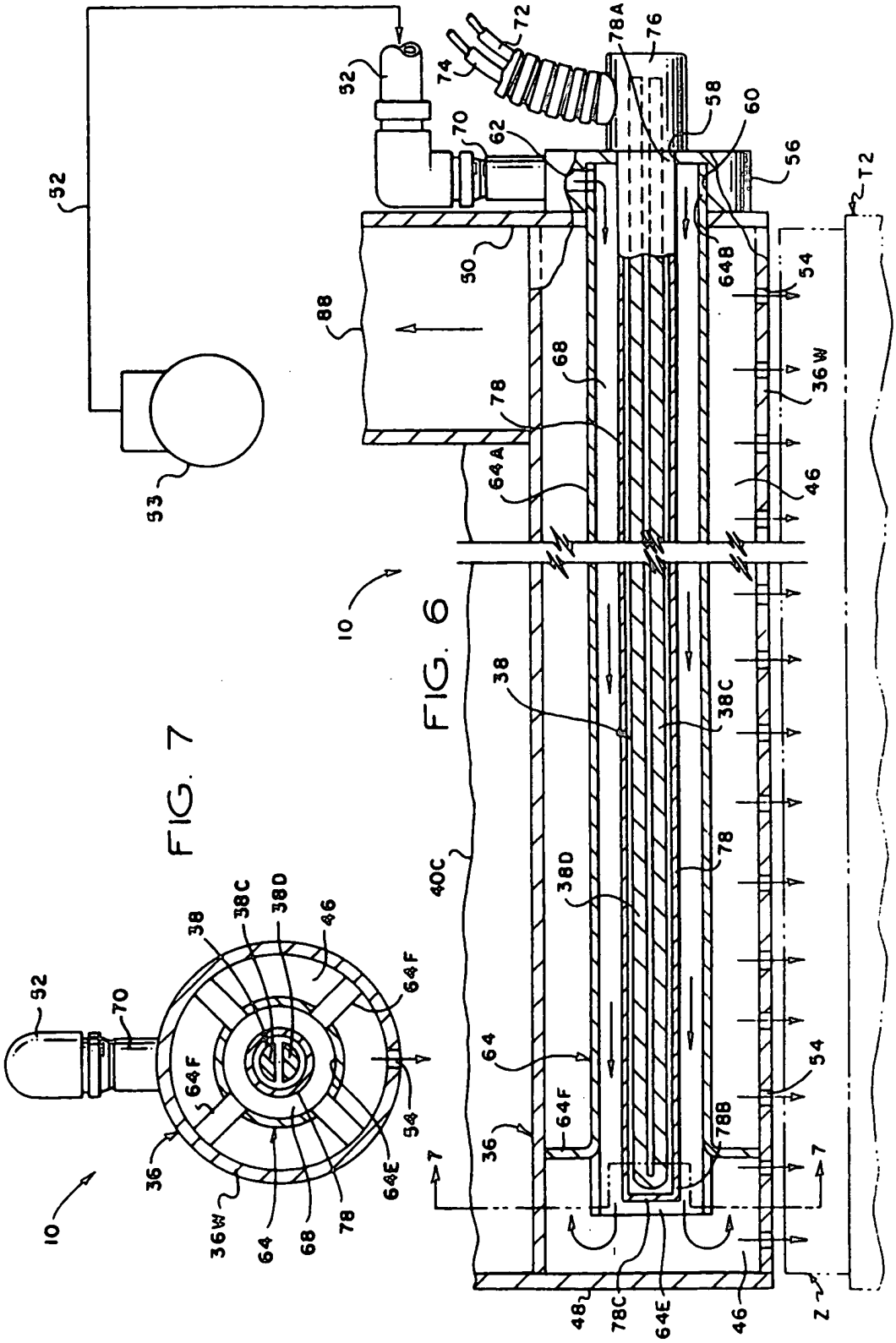

10
32
33
52
72
74
78A
76
58
60
56
62
70
50
88
68
78
64A
64B
54
36W
46
T2
38
38C
40C
38D
64
64F
36
78B
7
48
78C
64E
Z

FIG. 6

10
92
70
64F
36
36W
64
68
78
64E
94
38
38C
38D
46

FIG. 7

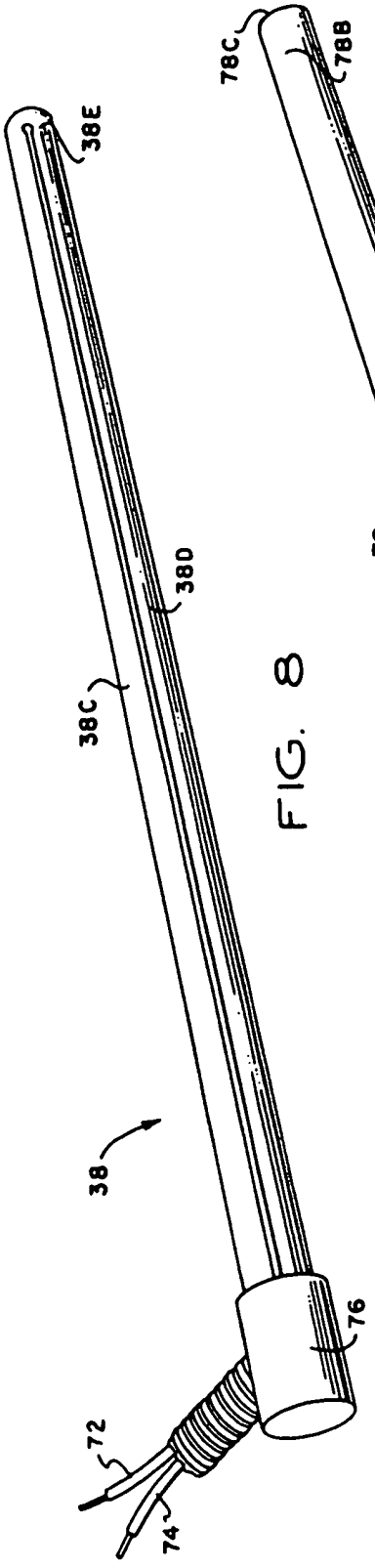


FIG. 8

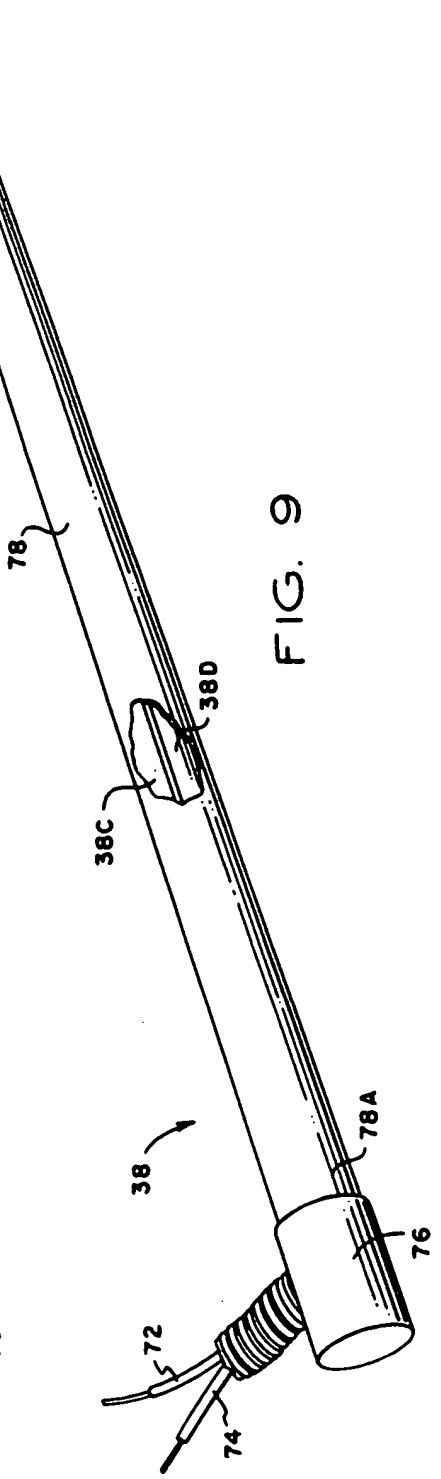


FIG. 9

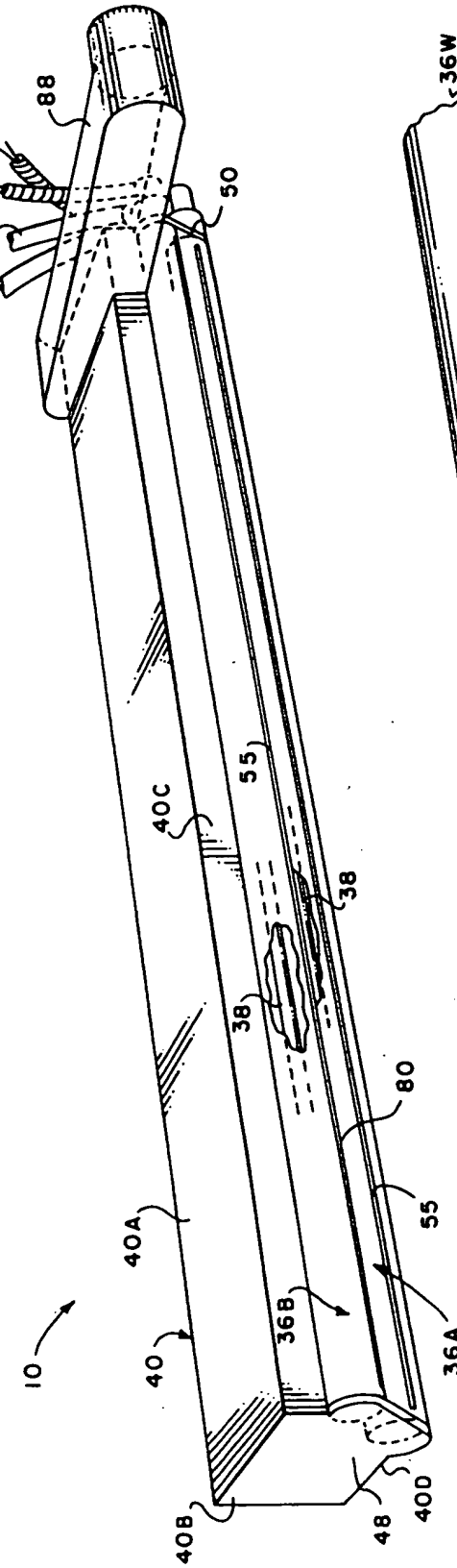

88
50
52
40C
55
38
38
80
55
40A
40
36B
36A
10
40B
48
40D

FIG. 10

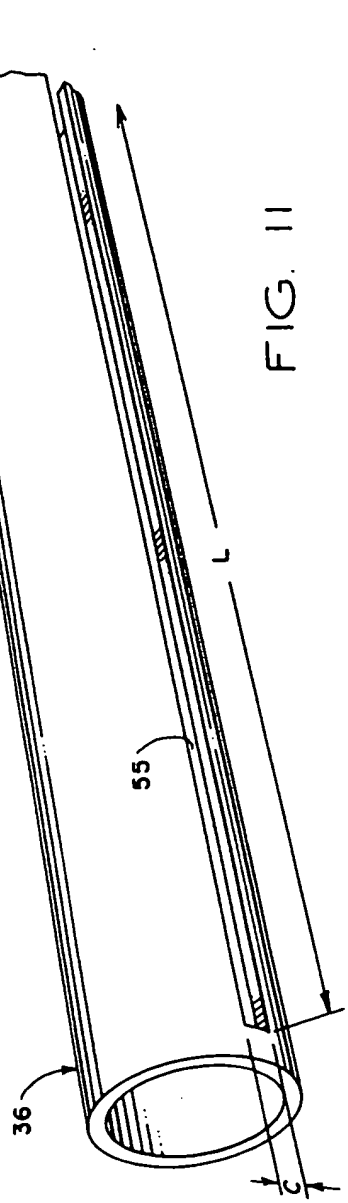

36W
L
55
36
t
c

FIG. 11

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 5812

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
X	US-A-2 683 939 (MASTER APPLIANCE)	1-4,6,7, 10,16,17	B41F23/04 F26B21/00
	* the whole document *		
Y		9,12,13, 19,21,23	
Y	FR-A-1 340 311 (ATELIERS ET CHANTIERS DE NANTES) * the whole document *	9,13,19, 21,23	
Y	US-A-1 737 174 (WILLIAM J. PRICE) * the whole document *	12	
A	US-A-3 079 702 (JAMES HALLEY & SONS)		
A	WO-A-90 03888 (PLATSCH)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B41F
F26B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 January 1995	Loncke, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

Veredelung

Lackier-Aggregat für Speedmaster-Maschinen

Mit einem Dahlgren-Lackierwerk LPC erhalten Speedmaster-Drucker die Möglichkeit, vorhandene Maschinen aufzurüsten, um nach wie vor mehrfarbig zu drucken und zusätzlich zu lackieren, ohne daß hierfür ein Druckwerk geopfert werden muß. Eine Vierfarben-Maschine zum Beispiel bleibt eine Vierfarben-Maschine, das Lackieren wird zusätzlich ermöglicht.

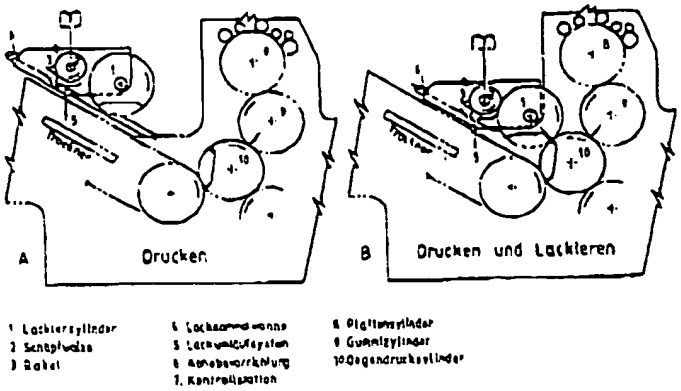
Der Einbau der LPC-Einheit erfolgt zwischen dem letzten Druckturm und dem Ausleger. Das Lackwerk kann durch Knopfdruck zur Auslage hin hydraulisch verfahren werden, wodurch für Service- und Einstellarbeiten der freie Zugang zum letzten Werk erhalten bleibt.

Da es sich bei der LPC-Einheit um ein echtes Lackierwerk handelt, ist sowohl Schutzlackierung als auch Hochglanzlackierung möglich, die gewünschte Lackauftragsmenge wird durch die Gravurtiefe der Schöpfwalze (Anilox-Walze) festgelegt. Vollflächige Lackierung ist ebenso möglich wie Spot-Lackierung, wobei ein Registersystem die passergenaue Lackübertragung erleichtert.

Je nach Bedarf kann UV- oder Dispersionslack eingesetzt werden. Ein Ablagern oder Austrocknen des Lacks wird durch ein kontinuierliches Umpumpen vermieden, was wiederum einen gleichmäßigen Lackauftrag gewährleistet.

LPC-Lackierwerke sind zur Zeit für Speedmaster 72 und 102 sowie für Mitsubishi-Maschinen verfügbar.

Das Augsburger Lieferwerk informiert auch über Trocknungs-Systeme, und zwar sowohl über IR-Heißluft-Trocknung als auch über UV-Härtung.



Zeichnung A zeigt das Lackierwerk in ausgefahrener Position, Zeichnung B im Eingriff mit dem Druckwerk, das heißt in Lackierposition.

Aggregate

Optimierte Heiz- und Kühlwalzen

Eine deutlich verbesserte Zwangsführung der Kühl- und Heizmedien bei ihren Heiz- und Kühlwalzen hat die W. Hähl KG, Kieselbronn, durch Optimierungsmaßnahmen in der typischen Zapfen- und Bodenkonstruktion erreicht.

Entsprechende Heiz- und Kühlwalzen sind in Dimensionen von bis zu 1000 mm Durchmesser und von bis zu 10000 mm Länge lieferbar. Sorgfältig dynamisch ausgewuchtet verfügen sie über eine extreme Laufruhe und bieten über lange Betriebszeit sichere Funktion.

Druckvorstufe

Verbesserte Repetierkopiermaschinen

Die bisherigen Universal-Repetierkopier-Maschinen PC-801 und PC-802 von Screen, die bekanntlich auch als manuelle Kontaktkopierrahmen für die Plattenkopie genutzt werden können, wurden durch optimierte Konstruktionen abgelöst. Die drei Varianten des Modells PC-803 sind wie folgt ausgelegt:

- PC-803-E deckt die Maschinenklasse I ab (effektives Kopierformat 73 x 62 cm);
- PC-803-G ist für das IIIB-Format (77 x 103 cm) bestimmt;
- PC-803-I reicht bis zum Ver Format (131 x 105 cm).

Die grundsätzlichen Abläufe wurden beibehalten, die jetzt geschlossene Kompaktbauweise mit zusätzlichen automatischen Mechanismen ermöglicht aber staubfreieres Kopieren und mindert die Geräuschbelastung. Durch die neue UV-Lichtschutzscheibe kann der Bediener alle Abläufe visuell kontrollieren.

Bei den großen Modellen G und I fährt das Lampenhaus in seitlicher Richtung mit, und die bewegliche 4-kW - Metallhalogenidlampe verstellt sich auch in der Höhe automatisch. Dies gestattet bei kleineren Filmvorlagen (zum Beispiel Etiketten) oder im Bereich der Umschlagseitenproduktion eine noch bessere Ausleuchtung, höhere Lichtintensität und damit verkürzte Belichtungszeiten.

Einer eventuellen Lichthofbildung an der Maskenkante wird durch die bessere Maskenkonstruktion mit reduziertem Abstand zwischen Maske und Glasscheibe vorgebeugt.

Sobald bei den Kopier- und Montage-Maschinen ▶

⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　昭63-62733

⑤Int.Cl.⁴	識別記号	庁内整理番号	㊸公開　昭和63年(1988)3月19日
B 41 F 31/00		6763-2C	

審査請求　有　発明の数 1　(全3頁)

㊹発明の名称　枚葉輪転機の切替え可能なインキ装置

㉑特　願　昭62-211528

㉒出　願　昭62(1987)8月27日

優先権主張　㉜1986年8月27日㉝西ドイツ(DE)㉛P3629081.5

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明　細　書

1　発明の名称

枚葉輪転機の切替え可能なインキ装置

2　特許請求の範囲

枚葉輪転機の切替え可能なインキ装置であつて、常時接触するインキ着けローラ並びに中間ローラの一群がインキ供給機構と版面との間に配置されており、印刷の停止に伴いこれらのローラ群へのインキ供給も版面へのインキ放出も中断可能であり、インキの中継および分配のために協働するインキ着けローラおよび中間ローラの数を選択的に多くするか又は少なくするように少なくとも1つの中間ローラが手動又は機械式に切替え可能である形式のものにおいて、インキ着けローラ(4，5，6)と協働する1つの中間ローラ(13)に付加的なインキ供給機構(17)が係合兼しや断可能であり、主インキ装置運転中付加的なインキ供給機構(17)のしや断状態で協働するローラ(6，12；9，13)が、付加的なインキ供給機構(17)の係合状態での短縮インキ装置運転中互いに分離可能であることを特徴とする、枚葉輪転機の切替え可能なインキ装置

3　発明の詳細な説明

産業上の利用分野

本発明は、枚葉輪転機の切替え可能なインキ装置であつて、常時接触するインキ着けローラ並びに中間ローラの一群がインキ供給機構と版面との間に配置されており、印刷の停止に伴いこれらのローラ群へのインキ供給も版面へのインキ放出も中断され、インキの中継および分配のために協働するインキ着けローラおよび中間ローラの数を選択的に多くするか又は少なくするように少なくとも1つの中間ローラが手動又は機械式に切替え可能である形式のものに関する。

従来の技術

この種の切替え可能なインキ装置は既に公知であつて、例えば西独特許出願公告第1234739号明細書の冒頭に述べられている。

この公知の切替え可能なインキ装置の難点は次の点にある。すなわち、インキ着けローラへ最短距離で最少限の中間ローラ、ひいては最少限のインキ分割によつてインキを供給することが不可能であるという点である。この場合常にインキ形成ローラよりも多くの中間ローラがインキ分割に供用されたままである。インキ着けローラは周知の通りインキ形成ローラとして数えることはできない。というのは、たんに中間ローラから受け取つたインキ膜を版面へ放出するだけだからである。例えば、見当合わせ又はその他の調整等のために、ほとんどインキを必要としないか又は校正刷り用のわずかな枚葉紙しか必要としないような場合、公知の切替え可能なインキ装置はそのインキ形成ラインが長過ぎるために応動が遅過ぎ、所要のインキと水とのバランス、要するに正しいインキ・水エマルジョンを得ることができないか或いは少なくとも早期に得ることができない。

本発明が解決しようとする課題

本発明の課題は、このような公知の切替え可能なインキ装置の場合に本刷りの間並びに本刷りの中断時に発生する中間ローラのインキのバランス状態もしくはインキ層厚減少の支障を、切替え操作、それも主インキ装置運転以外に校正刷り並びに最小インキ消費のための短縮インキ装置運転をも可能にする切替え操作によつて回避することである。

課題を解決するための手段

本発明はこのような課題を次のようにして解決した。すなわち、インキ着けローラと協働する1つの中間ローラに付加的なインキ供給機構が係合兼しや断可能であり、主インキ装置運転中に付加的なインキ供給機構がしや断された状態で協働するローラが、短インキ装置運転中に付加的なインキ供給機構が接続された状態で互いに分離可能であるように構成したのである。

実施例

次に図面に示した実施例に従つて本発明を説明する：

第1のインキ供給機構、例えばインキ出しローラ1と揺動するインキ移しローラ2並びに版胴3上の版面との間に、主インキ装置運転中に協働するインキ着けローラ4，5，6，7と中間ローラ8，9，10，11，12，13，14，15，16とから成るローラ群が配置されている。この場合、中間ローラ11～15はインキならしローラとして、また中間ローラ16は内側のインキ着けローラ5，6の間へ上から係合する接続ローラとしてそれぞれ構成されている。

印刷の停止の際にインキ供給を中断するためにインキ着けローラ4～7の作用を解除する制御可能な解除機構は一般に周知であるため図示してない。主インキ装置運転中に協働するローラ9，13；6，12の分離操作と短縮インキ装置運転のためのローラ群4，5，6，13，16の形成とにとつて必要な調整機構、例えば偏心軸受、空圧シリンダ、旋回レバーその他もやはり一般に周知である。従つて、相応の切替え操作は図中で切替え可能な中間ローラ9およびインキ着けローラ6の鎖線図示によつて概略的に示すにとどめた。

短縮インキ装置運転時のローラ群として協働するローラ4，5，6，13，16を、例えば版胴2の中心軸線を中心として旋回可能であるか又は印刷装置内で下降可能である1つのインキ装置フレーム内に配置して、このインキ装置フレームを切り替えることも可能であり、かつ公知である。

同じことが付加的なインキ供給機構17についてもいえる。このインキ供給機構17は例えば下降可能又は旋回可能に印刷装置内に配置されていて、迅速に応動するインキ装置として1つの調量ローラ18と2つの中間ローラ19，20と1つの自動調整式のインキ供給源21とから成つている。

このように切り離された迅速応動式の短縮インキ装置4，5，6，13，16，17，18～21においては直ちにインキ・水バランスが得

られる。従つて試し刷り用並びにわずかなインキ消費用として特に適している。ローラ群4，5，6，13，16を短縮インキ装置運転から主インキ装置運転への切替えを付加的なインキ供給機構17のしや断とにより本刷り用の平常のインキ装置状態へ移行することができ、要するに平常のインキ消費から最大のインキ消費のインキ装置状態へ移行することができる。事実上インキを必要としない場合には主インキ装置運転へ切替えなくてよく、たんに短縮インキ装置4，5，6，13，16，17～21のみで作業が行なわれる。

主インキ装置運転中本刷りの中断に伴つて生ずるインキ・水バランス状態もしくは中間ローラ8～15のインキ層厚減少の支障を避けるために、公知の制御可能な機構によつて短縮インキ装置運転への切替えを印刷停止に連動させることもできる。

4　図面の簡単な説明

図面は本発明の実施例を示す概略図である。

1－インキ出しローラ、2－インキ移しローラ、3－版胴、4，5，6，7－インキ着けローラ、8，9，10，11，12，13，14，15，16－中間ローラ、17－付加的なインキ供給機構、18－調量ローラ、19，20－中間ローラ、21－自動調整式インキ供給源

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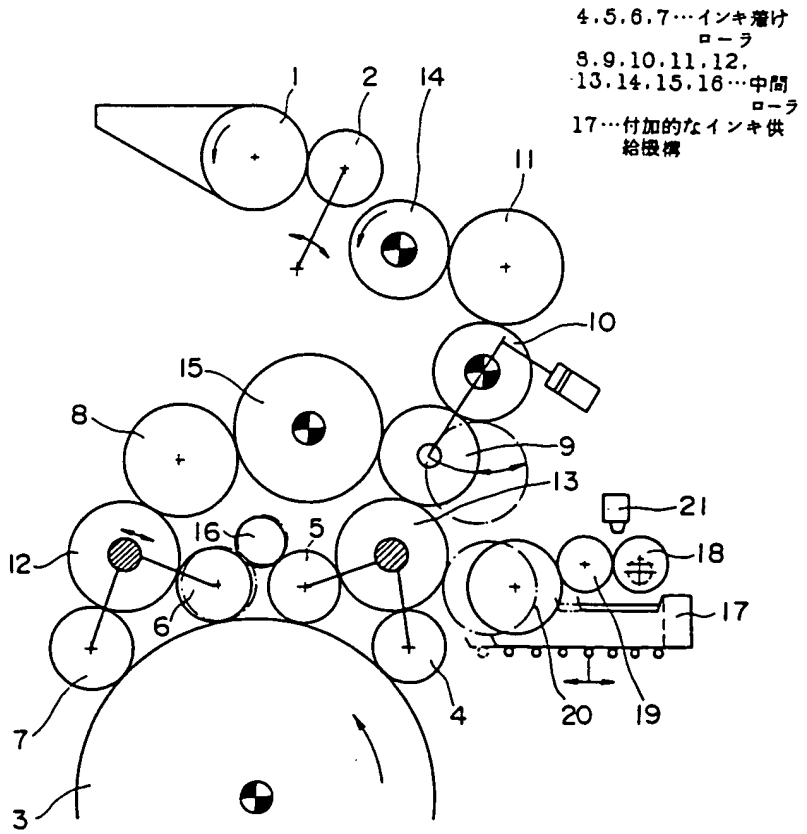

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【提出日】　平成 8年 5月 2日

【あて先】　特許庁長官　殿

【発明の名称】　印刷ユニット相互間でフェリス運動をする引込み自在なインキング／コーティング装置

【請求項の数】　22

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【書類名】 外国語明細書

1. Title of Invention

"RETRACTABLE INKING/COATING APPARATUS HAVING FERRIS MOVEMENT BETWEEN PRINTING UNITS"

2. Claims

1. Inking/coating apparatus for use in a printing press of the type having a printing unit on which a plate cylinder, a blanket cylinder and an impression cylinder are mounted for rotation, wherein the inking/coating apparatus is characterized by:

an applicator head for applying ink or coating material to a plate mounted on the plate cylinder or to a blanket mounted on the blanket cylinder, either separately or simultaneously when the inking/coating apparatus is in an operative position relative to the plate and blanket cylinders; and,

a carriage assembly for moving the applicator head to the operative position in which the applicator head is disposed laterally adjacent to the plate and blanket cylinders and for moving the applicator head from the operative position to a retracted position in which the applicator head is elevated with respect to the plate and blanket cylinders.

2. Inking/coating apparatus as set forth in claim 1, wherein the carriage assembly is characterized by:

a support arm having a first end portion constructed for pivotal attachment to the printing unit and having a second end portion pivotally coupled to the

/

applicator head, the applicator head being movable on the support arm to the operative position.

3. Inking/coating apparatus as set forth in claim 1, characterized in that a counterweight is coupled to the carriage assembly.

4. Inking/coating apparatus as set forth in claim 1, wherein the applicator head is characterized by:

a doctor blade assembly having a reservoir for receiving ink or liquid coating material; and,

an applicator roller coupled to the doctor blade assembly in fluid communication with the reservoir, the applicator roller being engagable with a printing plate on the plate cylinder or with a blanket on the blanket cylinder when the applicator head is in the operative position.

5. Inking/coating apparatus as set forth in claim 4, characterized in that the applicator roller is an anilox roller having a resilient transfer surface.

6. Inking/coating apparatus as set forth in claim 1, characterized in that:

a power actuator is movably coupled to the applicator head, the power actuator having a power transfer arm which is extendable and retractable; and,

movement converting apparatus is coupled to the power transfer arm for converting extension or retraction movement of the power transfer arm into pivotal movement of the applicator head relative to the carriage assembly.

7. Inking/coating apparatus as set forth in claim 6, wherein the movement converting apparatus is characterized by:

a bell crank plate having a first end portion coupled to the power transfer arm and having a second end portion for engaging a stop member;

a stop member secured to the applicator head; and,

a clevis plate secured to the carriage assembly and pivotally coupled to the bell crank plate.

8. Inking/coating apparatus as set forth in claim 1, wherein the applicator head is characterized by:

first and second side frame members pivotally coupled to the carriage assembly;

a doctor blade assembly mounted on the first and second side frame members, the doctor blade assembly including a reservoir for receiving ink or liquid coating material;

a cradle assembly mounted on the first and second side frame members, respectively;

an applicator roller mounted for rotation on the cradle assembly and coupled to the doctor blade assembly for rolling contact with ink or coating material in the reservoir, the applicator roller being engagable with a printing plate on the plate cylinder or with a blanket on the blanket cylinder when the applicator head is in the operative position; and,

a drive motor coupled to the applicator roller for rotating the applicator roller.

9. Inking/coating apparatus as set forth in claim 8, characterized in that:

the cradle assembly has first and second sockets disposed on the first and second side frame members respectively; and,

the applicator roller is mounted for rotation on the first and second sockets.

10. Inking/coating apparatus as set forth in claim 8, characterized in that

the cradle assembly includes first and second sockets disposed on the first and second side frame members, respectively, and third and fourth sockets disposed on the first and second side frame members, respectively; and,

the applicator roller is selectively mountable for rotation on either the first and second sockets or on the third and fourth sockets for applying ink

or coating material to either the plate or blanket when the applicator head is in the operative position.

11. Inking/coating apparatus as set forth in claim 1, wherein the applicator head is characterized by:

a first cradle for supporting an applicator roller for engagement with the plate when the inking/coating apparatus is in the operative position; and

a second cradle for supporting an applicator roller for engagement with the blanket when the inking/coating apparatus is in the operative position.

12. Inking/coating apparatus as set forth in claim 1, wherein the carriage assembly is characterized by:

a support arm having a first end portion pivotally coupled to the printing unit and having a second end portion;

a common pivot shaft on which the support arm second end portion and the inking/coating apparatus are pivotally mounted; and,

male and female latch members coupled between the common pivot shaft and the printing unit, with one of the latch members being secured to the common pivot shaft and the other latch member being constructed for attachment onto the printing unit, the latch members being mateable in interlocking engagement when the applicator head is in the operative position.

13. Inking/coating apparatus as set forth in claim 1, wherein the applicator head and the printing unit are characterized by:

male and female latch coupling members mounted on the carriage assembly and on the printing unit for releasably latching the carriage assembly in interlocking engagement with the printing unit when the applicator head is in the operative position.

14. Inking/coating apparatus as set forth in claim 1, wherein the carriage assembly is characterized by an elongated shank portion and a hub portion, the elongated shank portion being pivotally coupled to the applicator head and the hub portion being constructed for pivotal attachment onto the printing unit.

15. A rotary offset printing press having first and second printing units and the inking/coating apparatus of claim 1 is movably coupled to the first printing unit as set forth in claim 1, characterized by:

a dryer mounted on the first printing unit adjacent the impression cylinder of the first printing unit for discharging heated air onto a freshly printed substrate while the freshly printed substrate is in contact with said impression cylinder.

16. A rotary offset printing press as defined in claim 15, characterized in that:

an extractor is disposed adjacent the dryer for extracting hot air, moisture and volatiles from an exposure zone between the dryer and the freshly printed substrate.

17. A rotary offset printing press as defined in claim 15, characterized in that:

an intermediate transfer cylinder is coupled in sheet transfer relation with the impression cylinder of the first printing unit; and,

an interstation dryer is disposed adjacent the intermediate transfer cylinder for discharging heated air onto a freshly printed or coated substrate after it has been transferred from the impression cylinder of the first printing unit and while it is in contact with the intermediate transfer cylinder.

18. A method for rotary offset printing in a printing press of the type including first and second rotary offset printing units, and using aqueous or UV-curable printing ink or coating material in the operation of at least the first printing unit, characterized by the following steps performed at each printing unit in succession:

spot or overall coating the plate with aqueous ink/aqueous coating material or UV-curable ink/UV-curable coating material;

spot and/or overall coating the blanket with aqueous ink/aqueous coating material or UV-curable ink or UV-curable coating material;

transferring the printing ink or coating material from the printing plate to the blanket;

transferring the inked or coated image from the blanket to a substrate as the substrate is transferred through the nip between the impression cylinder and the blanket; and,

drying the ink or coating material on the freshly printed substrate before the substrate is subsequently processed.

19. A method for rotary offset printing as defined in claim 18, wherein the drying step is characterized by:

discharging high velocity, heated air onto the freshly printed/coated substrate while the freshly printed/coated substrate is in contact with the impression cylinder of the first printing unit.

20. A method for rotary offset printing as defined in claim 18, characterized by the steps:

transferring the freshly printed substrate from the first printing unit to an intermediate transfer cylinder; and,

drying the freshly printed substrate while it is in contact with the intermediate transfer cylinder.

21. A method for rotary offset printing as defined in claim 18, characterized by the step:

extracting hot air, moisture and volatiles from an exposure zone above the freshly printed/coated substrate while the freshly printed/coated substrate is in contact with the impression cylinder.

22. A method for rotary offset printing as defined in claim 18, characterized by the steps:

applying a primer coating of an aqueous coating material or UV-curable coating material to a substrate in the first printing unit; and,

drying the primer coating on the substrate before the substrate is processed in the second printing unit.

3. Detailed Description of Invention

This invention relates to sheet-fed or web-fed, rotary offset or flexographic printing presses, and more particularly, to a new and improved inking/coating apparatus for the in-line application of printing inks or protective or decorative coatings to sheet or web substrates.

Conventional sheet-fed, rotary offset printing presses typically include one or more printing units through which individual sheets are fed and printed with wet ink. Since the inks used with rotary offset printing presses typically remain wet and tacky for some time after printing, special precautions must be taken to insure that the freshly printed sheets are not marked or smeared as the sheets are transferred from one printing unit to another, and while being conveyed to the sheet delivery stacker. The printed surface of the freshly printed sheet dries relatively slowly and can be smeared during subsequent transfer between printing units. In order to reduce smearing and offsetting, spray powder is applied on the printed sheet.

In some printing applications, offset and smearing are prevented by applying a protective and/or decorative coating over all or a portion of the freshly printed sheets. Various arrangements have been proposed for applying the protective or decorative coating as an in-line operation by using the last printing unit of the press as the coating application unit. However, when such in-

line coating is performed, the last printing unit cannot be used to apply ink to the sheets, and can only be used for the coating operation. Thus, while coating with these types of in-line coating apparatus, the press loses the capability of printing its full range of colors since the last printing unit is converted to a coating unit.

It will be appreciated that the time required to reconfigure a press for coating or non-coating is non-productive and costly. Accordingly, there is a need for an in-line coating apparatus that minimizes the time to clean-up from one printing run and set-up and run the next job. Where consecutive jobs require the same type of coating, particularly blanket coating, it may not be necessary to clean-up the coater between jobs. However, the coating material cannot be allowed to dry on the rollers. Therefore, especially when switching from blanket to spot coating or vice versa, or if there is a delay between jobs, it is necessary to wash-up the coater after each job is completed.

In addition, coater wash-up is necessary when switching between different coating compositions, such as aqueous and ultra violet (UV) curable coatings. Such coating materials are not interchangeable, and consequently, the coater must be washed between applications of different coating media.

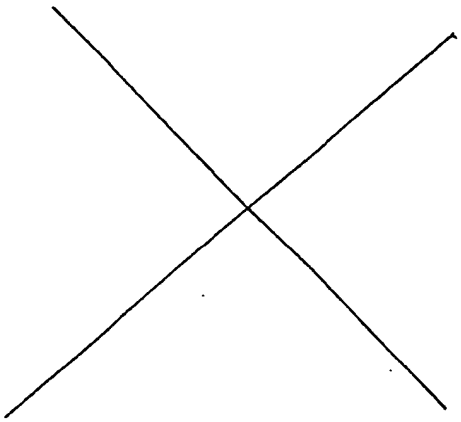
The foregoing limitations are overcome, according to the present invention, by a retractable, in-line inking/coating apparatus which is mounted on a printing

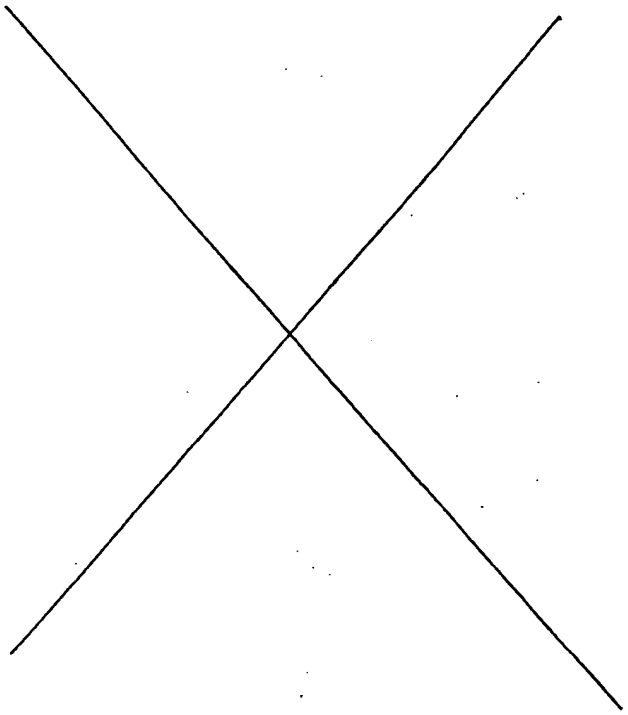
unit for pivotal, Ferris wheel movement between an operative inking/coating position and a retracted, overhead idle position. The inking/coating apparatus includes an applicator head which, is positioned in alignment with either the plate cylinder or the blanket cylinder by a carriage assembly which includes a cantilevered support arm. The support arm is pivotally coupled between the inking/coating head and the printing unit tower. This cantilevered, pivotal mounting arrangement allows the inking/coating unit to be used between two printing units, as well as on the last printing unit of the press.

In the preferred embodiment, the applicator head includes vertically spaced pairs of cradle members with one cradle pair being adapted for supporting a metal or ceramic coating roller in alignment with a blanket cylinder, and the other cradle pair supporting a resilient anilox coating roller in alignment with the plate cylinder, respectively, when the carriage assembly is in the operative position. Because of the cantilevered, pivotal support provided by the support arm, the applicator head can be lifted and lowered through an arc, similar to Ferris wheel movement, in the limited space between adjacent printing units. When fully retracted, the applicator head and carriage assembly are lifted to an elevated, retracted overhead position, preferably an overhead position overlying the printing unit tower, thus providing complete access to the interstation space and the printing unit cylinders without causing the printing unit to lose its printing capability. The

inking/coating applicator roller of the applicator head can be inspected, cleaned or replaced and the doctor blade assembly can be washed-up automatically while the inking/coating apparatus is in the retracted position.

When the inking/coating apparatus is used in combination with a flexographic printing plate and aqueous ink or aqueous coating, the water component of the aqueous ink or coating on the freshly printed sheet is evaporated by a high velocity, hot air interstation dryer and a high volume heat and moisture extractor assembly so that the freshly printed ink or coating is completely dry before the sheet is printed on the next printing unit. This quick drying flexographic printing/coating arrangement permits a base coat of ink, for example opaque white or metallic ink (gold, silver or other metallics) to be applied in the first printing unit, and then overprinted by a lithographic process on the next printing unit.





As used herein, the term "processed" refers to various printing methods which may be applied to either side of a substrate, including the application of UV-curable and aqueous inks and/or coatings. The term "substrate" refers to sheet or web material. Also, as used herein, the term "waterless printing plate" refers to a printing plate having non-image surface areas which are hydrophobic and also having image surface areas which are hydrophilic, wherein the non-image surface areas are characterized by a surface tension value which is less than the surface tension of aqueous ink, and the image surface areas are characterized by a surface tension value which is greater than the surface tension of aqueous ink. "Flexo-

graphic" refers to flexible printing plates having a relief surface which is wettable by aqueous ink or aqueous coating material.

As shown in the exemplary drawings, the present invention is embodied in a new and improved in-line inking/coating apparatus 10, for applying inks or protective and/or decorative coatings to sheets or webs printed in a sheet-fed or web-fed, rotary offset or flexographic printing press, herein generally designated 12. In this instance, as shown in FIGURE 1, the inking/coating apparatus 10 is installed in a four color printing press 12, such as that manufactured by Heidelberger Druckmaschinen AG of the Federal Republic of Germany under its designation Heidelberg Speedmaster 102V. The press 12 includes a press frame 14 coupled at one end, herein the right end, to a sheet feeder 16 from which sheets, herein designated S, are individually and serially fed into the press, and at the opposite end, with a sheet delivery stacker 20 in which the freshly printed sheets are collected and stacked. Interposed between the sheet feeder 16 and the sheet delivery stacker 20 are four substantially identical rotary offset printing units 22, 24, 26 and 28 which can print different color inks onto the sheets as they are transferred through the press 12. The printing units are housed within printing towers T1, T2, T3 and T4 formed by side frame members 14, 15.

As illustrated, the printing units 22, 24, 26 and 28 are substantially identical and of conventional design.

The first printing unit 22 includes an in-feed transfer cylinder 30, a plate cylinder 32, a blanker cylinder 34 and an impression cylinder 36, all supported for rotation in parallel alignment between the press side frames 14, 15. Each of the first three printing units 22, 24 and 26 have an interunit transfer cylinder 38 disposed to transfer the freshly printed sheets from the adjacent impression cylinder to the next printing unit via an interstation transfer cylinder 40. The last printing unit 28 is shown equipped with a delivery cylinder 42 which guides each freshly printed sheet 18 as it is transferred from the last impression cylinder 36 to a delivery conveyor system, generally designated 44, to the sheet delivery stacker 20.

The delivery conveyor system 44 as shown in FIGURE 2 is of conventional design and includes a pair of continuous delivery gripper chains 46, only one of which is shown carrying at regular spaced locations along the chains, laterally disposed gripper bars having gripper fingers for gripping the leading edge of a freshly printed sheet 18 after it leaves the nip between the delivery cylinder 42 and impression cylinder 36 of the last printing unit 28. As the leading edge is gripped by the grippers, the delivery chains 46 pull the freshly printed sheet away from the impression cylinder 36 and deliver the freshly printed sheet to the sheet delivery stacker 20.

Prior to reaching the delivery sheet stacker, the freshly printed and/or coated sheets S pass under a delivery dryer 48 which includes a combination of infra-red

thermal radiation, high velocity hot air flow and heat and moisture extraction for drying the ink and/or the protective/decorative coating on the freshly printed sheets.

In the exemplary embodiment shown in FIGURE 1, the first printing unit 22 is equipped with a flexographic printing plate, and does not require an inking roller train or a dampening system. If an ink roller train is mounted on the first printing unit, the form rollers are retracted and locked off when the printing unit goes on impression. Flexographic aqueous ink is supplied by the inking/coating unit 110. The remaining printing units 24, 26 and 28 are equipped for lithographic printing and include an inking apparatus 50 having an inking roller train 52 arranged to transfer ink from an ink fountain 54 to the plate cylinder 32. This is accomplished with the aid of a fountain roller 56 and a ductor roller. The fountain roller 56 projects into the ink fountain 54, whereupon its surface is wetted with printing ink Q. The printing ink Q is transferred intermittently to the inking roller train 52 by the ductor roller. The inking roller train 52 supplies printing ink Q to the image ares of a printing plate P mounted on the plate cylinder 32.

The printing ink Q is transferred from the printing plate P to an ink receptive blanket B which is mounted on the blanket cylinder 34. The inked image carried on the blanket B is transferred to a sheet S as the sheet is transferred through the nip between the impression cylinder 36 and the blanket B.

The inking roller arrangement 52 illustrated in FIGURE 1 is exemplary for use in combination with lithographic ink printing plates. It will be understood that dampening rollers (not illustrated) will be in direct engagement with the lithographic plate P, but are not used in combination with the flexographic plate of printing unit 22.

Referring now to FIGURE 4, FIGURE 5 and FIGURE 6, the in-line inking/coating apparatus 10 includes a carriage assembly 58 which supports an applicator head 60. The applicator head 60 includes a hydraulic motor 62, a lower gear train 64, an upper gear train 65, an applicator roller 66 and a doctor blade assembly 68. The external peripheral surface of the applicator roller 66 is inserted into wetting contact with liquid coating material or ink contained in a reservoir 70. The reservoir 70 is continuously supplied with ink or coating which is circulated through the reservoir 70 from an off-press source by a pump (not illustrated). The hydraulic motor 62 drives the applicator roller 66 synchronously with the plate cylinder 32 and the blanket cylinder 34 in response to an RPM control signal from the press drive (not illustrated) and a feedback signal developed by a tachometer 72. While a hydraulic drive motor is preferred, an electric drive motor can be used.

The applicator roller 66 is preferably a fluid metering anilox roller which transfers measured amounts of printing ink or coating material onto the printing plate or

blanket. The surface of an anilox roller is engraved with an array of closely spaced, shallow depressions referred as "cells". Ink or coating material from the reservoir 70 flows into the cells as the anilox roller turns through the reservoir. The transfer surface of the anilox roller is scraped with a doctor blade 73 to remove excess ink or coating. The ink or coating remaining on the anilox roller is the measured amounts contained within the cells.

The applicator roller 66 is cylindrical and may be constructed in various diameters and lengths, containing cells of various sizes and shapes. The volumetric capacity of an anilox roller is established during manufacturing and is dependent upon the selection of cell size, shape and number of cells per unit area. Depending upon the intended application, the cell pattern may be fine (many small cells per unit area) or coarse (fewer larger cells per unit area).

By applying the ink or coating material through the inking/coating applicator head 60, more ink or coating material can be delivered to the sheet S as compared with the inking roller train of a lithographic printing unit. Moreover, color intensity is stronger and more brilliant because the flexographic ink is applied at a much larger film thickness than can be applied by the lithographic process and is not diluted by dampening solution.

The inking/coating applicator head 60 includes side frame members 74, 76 that support the applicator roller 66, gear train 64, gear train 65, doctor blade

assembly 68 and the drive motor 62. The applicator roller 66 is supported at opposite ends on a lower cradle formed by a pair of end plates 78, 80 which hold the applicator roller 66 in parallel alignment with the blanket cylinder 34 (FIGURE 5). The side frames 74, 76 are also provided with an upper cradle formed by a pair of side plates 82, 84 which are vertically spaced with respect to the lower side plates 78, 80. Each cradle has a pair of sockets 79, 81 and 83, 85, respectively, for holding the applicator roller 66 for spot coating or inking engagement against the plate P of the plate cylinder 32 (FIGURE 4) or the blanket B of the blanket cylinder 34.

Preferably, the applicator roller 66 for the upper cradle (plate) position is an anilox roller having a resilient transfer surface. In the dual cradle arrangement, the press operator can quickly change over from blanket inking/coating and plate inking/coating with minimum press down time, since it is only necessary to remove and reposition or replace the applicator roller 66, and wash-up the doctor blade assembly if changing from ink to coating or vice versa. The capability to selectively operate in either the flexographic mode or the lithographic mode and to print or coat from either the plate or blanket position is referred to herein as the "LITHOFLEX" process.

Referring again to FIGURE 2 and FIGURE 3, the applicator head 60 is supported by the carriage assembly 58 in a cantilevered, pivotal arrangement which allows the dual cradle inking/coating apparatus 10 and a single cradle

inking/coating apparatus 110 to be used between any two adjacent printing units, as well as used on the first and last printing units of the press. This is made possible by a pair of cantilevered support arms 88, 90 that are pivotally coupled to the side plates 74, 76, respectively, on a pivot shaft 77. Each support arm has a hub portion 88A, 90A, respectively, and an elongated shank portion 88B, 90B, respectively.

The cantilevered support arms are pivotally mounted on the printing tower by pivot blocks 92, 94, respectively. The hub portions 88A, 90A are journalled for rotation on pivot shafts 96, 98, respectively. The pivot blocks 92, 94 are securely fastened to the tower 14D, so that the carriage assembly 86 is pivotally suspended from the pivot shafts 96, 98 in a cantilevered Ferris support arrangement. The shank portions 88B, 90B are pivotally coupled to the pivot shaft 77, so that the carriage assembly 58 and the applicator head 60 are capable of independent rotation with respect to each other and with respect to the pivot shaft 77. By this arrangement, the applicator head 60 is pivotally suspended from the pivot shaft 77, and remains in an upright orientation as the support arms rotate from the operative position to the fully retracted position, and vice versa.

Thus, the cradles 78, 80 and 82, 84 position the applicator roller 66 in vertical and horizontal alignment with the plate cylinder or blanket cylinder when the applicator head is extended to the operative position, for

example as shown in FIGURE 4 and FIGURE 5. Moreover, because of the transverse relationship between the hub portion and shank portion of the support arms, the applicator head 60 and carriage assembly 58 are capable of rotating through a Ferris arc without touching the adjacent printing tower. This makes it possible to install the inking/coating apparatus 10 on any intermediate printing unit tower (T2, T3), and as well as on the first printing unit tower T1 and the last printing unit tower T4. Additionally, when the inking/coating unit 10 is in the operative position, the lateral projection of the applicator head 60 into the interstation space between printing units is minimized. This assures virtually unrestricted operator access to the interstation space between adjacent printing units when the applicator head is engaged in the operative position, and completely unrestricted access when the carriage assembly 58 is retracted.

Rotation of the carriage assembly 58 is counterclockwise from the retracted, idle position (shown in phantom in FIGURE 1) to the operative position (FIGURE 4 and FIGURE 5). The carriage assembly 58 can be adapted for clockwise rotation from the retracted position to the operative position for engagement of the applicator roller to either the plate or the blanket on the dampener side of the tower, assuming that access to the plate and blanket is not restricted by dampener rollers or the like.

Rotational movement of the support arms 88, 90 is assisted by counterweights 100, 102 which are secured to

the support arms, respectively, for concurrent rotation with respect to the pivot blocks 92, 94. With the passive assistance of the counterweights, the press operator can easily move the inking/coating assembly 10 from the engaged operative position as shown in FIGURE 4 to the fully retracted, idle position as shown in phantom in FIGURE 1. Preferably, rotation of the carriage assembly 58 is assisted by a torsion spring, electric motor or hydraulic motor.

The inking/coating apparatus 10 is releasably locked into the operative position as shown in FIGURE 4 by releasable latch couplings 103, 105 that secure the support arms 88, 90 to the press side frames 14, 15, respectively, of the printing unit tower T4 in the operative position. Coating engagement of the applicator roller 66 against the blanket cylinder 34 is produced by power actuators, preferably pneumatic cylinders 104, 106 which have extendable/retractable power transfer arms 104A, 106A, respectively. The pneumatic cylinder 104 is pivotally coupled to the support arm 88 by a pivot linkage 108, and the second pneumatic cylinder 106 is pivotally coupled to the support arm 90 by a pivot linkage 109. In response to actuation of the pneumatic cylinders 104, 106, the power transfer arms are retracted. As the transfer arms retract, the inking/coating head 60 is rotated counterclockwise on the pivot shaft 77, thus moving the applicator roller 66 into coating engagement with the blanket cylinder 34.

The pivot linkage 108 includes a bell crank 111 which is mounted for pivotal movement on a pin 113. The pin 113 is supported by a clevis plate 115 which is attached to the support arm 88. One end of the bell crank is pivotally coupled to the actuator arm 104A, and a cam roller 117 is mounted for rotation on its opposite end.

The cam roller 117 is engagable against an adjustable stop 119 which is rigidly secured to the side plate 74. Counterclockwise shifting of the handle H moves a cam follower 121 into a latch pocket 123 of a receiver block 125 as the cam roller 117 is moved into engagement with the adjustable stop 119 in the interlocked, operative position. Referring to FIGURE 4, FIGURE 5 and FIGURE 6, the receiver block 125 is secured to the delivery side of the printing unit tower by machine screws.

When the plate P goes on impression, power is applied to the pneumatic actuator 104 and the power transfer arm 104A retracts, thus causing the bell crank 111 to rotate counterclockwise about the pin 113. The torque applied by the pneumatic actuator 104 is transmitted to the applicator head 60 through the cam roller 117 and the adjustable stop 119. Counterclockwise movement of the applicator head 60 relative to the support shaft 77 carries the applicator roller 66 into engagement with the plate P.

The adjustable stop 119 has a threaded bolt 119A which is engagable with the cam roller 117. The striking point of engagement is preset so that the applicator roller 66 is properly positioned for engagement with the plate P

or blanket B in the operative position when the applicator head 60 is interlocked with the press frame 14 and the printing unit goes on impression.

Referring to FIGURE 5, an inking/coating apparatus 110 having a single head is illustrated. The construction of this alternative embodiment is identical in all respects with the dual head arrangement, with the exception that only a single gear train and a single cradle for holding the applicator roller is provided. In both embodiments, the inking/coating head 60 remains upright as it swings through an arc, comparable to the movement of a Ferris wheel. Because of the upright orientation of the inking/coating head 60 as it moves between the extended and retracted positions, the usual platform spacing between printing unit towers provides adequate clearance to permit extension and retraction of the carriage assembly 58 without interference with operator access to the printing units. This is a significant advantage in that it permits the in-line inking/coating apparatus 10 to operate effectively in the interstation space between any adjacent printing units, and without blocking or obstructing access to the cylinders of the printing units when the inking/coating apparatus is in the retracted position (as indicated in phantom in FIGURE 1).

Moreover, when the in-line inking/coating apparatus is in the fully retracted position, the applicator roller 66 is conveniently positioned on the dampener side of the printing unit for inspection, clean-up or

replacement. Additionally, the doctor blade assembly is also conveniently positioned for inspection, removal, adjustment or clean-up. Also, the doctor blade reservoir and coating circulation lines can be cleaned while the press is running as well as when the press has been stopped for change-over from one type of ink or coating material to another.

When the inking/coating apparatus is used for applying an aqueous ink or an aqueous coating material, the water component on the freshly printed sheet S is evaporated by a high velocity, hot air interstation dryer and high volume heat and moisture extractor units 112 and 114, as shown in FIGURE 1, FIGURE 4 and FIGURE 5. The dryer/extractor units 112 and 114 are oriented to direct high velocity heated air onto the freshly printed/coated sheets as they are transferred by the interunit and the intermediate transfer cylinders 36, 40. By this arrangement, the freshly printed aqueous ink or coating material is completely dry before the sheet is overprinted in the next printing unit.

The high velocity, hot air dryer and high performance heat and moisture extractor units 112, 114 utilize high velocity air jets which scrub and break-up the moist air level which clings to the surface of each freshly printed sheet. Within each dryer, high velocity air is heated to a high temperature as it flows across a resistance heating element within an air delivery baffle tube. High velocity jets of hot air are discharged through

multiple airflow apertures through an exposure zone Z (FIGURE 4 and FIGURE 5) onto the freshly printed/coated sheet S as it is transferred by the transfer cylinder 36 and intermediate transfer cylinder 40, respectively. Each dryer assembly includes a pair of air delivery dryer heads which are arranged in spaced, side-by-side relation as shown in FIGURE 4 and FIGURE 5.

The high velocity, hot moisture-laden air displaced from each freshly printed sheet is extracted from the dryer exposure zone Z and completely exhausted from the printing unit by the high volume extractors. Each extractor head includes a manifold coupled to the dryer heads and draws the moisture, volatiles and high velocity hot air through a longitudinal gap between the dryer heads. According to this arrangement, each printed sheet is dried before it is run through the next printing unit.

The water-based inks used in flexographic printing dry at a relatively moderate drying temperature provided by the interstation high velocity hot air dryers/extractors 112, 114. Consequently, print quality is substantially improved since the aqueous ink is dried at each printing unit before it enters the next printing unit. Moreover, back-trapping on the blanket of the next printing unit is completely eliminated. This interstation drying arrangement makes it possible to print aqueous inks such as metallic ink and opaque white ink at one printing unit, and then overprint at the next printing unit.

This arrangement also permits the first printing unit to be used as a coater in which an aqueous coating is applied to low grade paper, for example recycled paper, to trap and seal in lint, dust, spray powder and other debris and provide a smoother, durable surface that can be overprinted in the next printing unit. The first down coating seals the surface of the low grade, rough substrate and improves overprinted dot definition while preventing strike-through and show-through. A UV-curable protective and/or decorative coating can be applied over the first down overprinted (aqueous) coating in the last printing unit.

Preferably, the applicator roller 66 is constructed of metal or ceramic when it is used for applying a coating material to the blanket B on the cylinder 34. When the applicator roller 66 is applied to the plate, it is preferably constructed as an anilox roller having a resilient transfer surface for engaging a flexographic printing plate. Suitable resilient roller surface materials include Buna N synthetic rubber and EPDM (terpolymer elastomer).

It will be appreciated that the inking/coating apparatus 10 is capable of applying a wide range of ink types, including fluorescent (Day Glo), pearlescent, metallics (gold, silver and other metallics), glitter, scratch and sniff (micro-encapsulated fragrance), scratch and reveal, luminous, pressure-sensitive adhesives and the like.

The press operator can eliminate the dampener roller assembly altogether, and the inking/coating apparatus 10 can selectively apply aqueous inks and coatings to a flexographic or waterless printing plate and the blanket. Moreover, overprinting of the aqueous inks and coatings can be carried out in the next printing unit since the aqueous inks and coatings are completely dried by the high velocity, hot air interstation dryer and high volume heat and moisture extractor assembly.

The aqueous inks and coatings as used in the present invention contain colored pigments and/or soluble dyes, binders that fix the pigments onto the surface of the printed sheet, and waxes, defoamers and thickeners. Aqueous printing inks predominantly contain water as a solvent, diluent and/or vehicle. The thickeners which are preferred include algonates, starch, cellulose and its derivatives, for example cellulose esters or cellulose ethers and the like. Coloring agents including organic as well as inorganic pigments may be derived from dyes which are insoluble in water. Also, the printing ink may contain water and can be predominantly glycol or the like, with the pigment being bound by an appropriate resin. When metallic inks are printed, the cells of the anilox roller must be appropriately sized to prevent the metal particles from getting stuck within the cells. The cell size is critical, and for metallic gold ink, the anilox roller should have a screen line count in the range of 175-300 lines per inch (69-118 lines per cm).

The inking/coating apparatus 10 can also apply UV-curable inks and coatings. If UV-curable inks and coatings are utilized, ultra-violet dryers/extractors are installed adjacent the high velocity hot air dryer/extractor units 112, 114, respectively.

It will be appreciated that the inking/coating apparatus 10 described herein makes it possible to selectively operate a printing unit in either the flexographic printing mode or the lithographic printing mode, while also providing the capability to print or coat from either the plate or blanket position. The dual cradle support arrangement of the present invention makes it possible to quickly change over from inking/coating at the blanket cylinder position to inking/coating at the plate cylinder position with minimum press down-time, since it is only necessary to remove and reposition or replace the applicator roller 66 while the printing/inking apparatus is in the retracted position.

Moreover, the press operator may elect to spot or overall coat with aqueous ink/coating from the plate during one job, and then spot and/or overall coat from the blanket during the next job. Since the doctor blade assembly can be flushed and washed-up quickly and the applicator roller can be replaced quickly, it is possible to spot coat or overall coat from the plate position or the blanket position with aqueous inks or coatings during the first press run and then spot coat or overall coat with UV-curable inks or coatings from the plate position or from

the blanket position during the next press run. The inking/coating apparatus 10 is completely out of the way in the retracted position; consequently, the doctor blade reservoir and supply lines can be flushed and washed-up by automatic wash-up equipment while the printing unit is printing another job.

The positioning of the applicator head and roller assembly relative to the plate and blanket is repeatable to a predetermined, preset impression position. Consequently, no printing unit adjustment or alteration is required, except for flushing the doctor blade assembly and cleaning or replacing the applicator roller to accommodate a different kind of ink or coating material. Although manual extension and retraction have been described in connection with the exemplary embodiment, extension to the operative position and retraction to a non-operative idle position can be carried out automatically by hydraulic or electric motor servomechanisms.

The Ferris wheel support arrangement allows the inking/coating apparatus to operate effectively in the interstation space between any adjacent printing units, as well as on the first or last printing units of the press, without blocking or obstructing the interstation space or restricting operator access to the cylinders of any of the printing units.

Finally, because the inking/coating apparatus of the present invention is mounted on a printing unit tower and is extendable to the operative position without

requiring adjustment or alteration of the printing unit cylinders, it can be used for applying printing ink or coating material to the blanket cylinder of a rotary offset web press, or to the blanket of a dedicated coating unit.

4. Brief Description of Drawings

FIGURE 1 is a schematic side elevational view of a sheet-fed, rotary offset printing press having inking/coating apparatus embodying the present invention;

FIGURE 2 is a perspective view of the printing press of FIGURE 1 in which a dual head inking/coating apparatus is in the operative coating position and a single head coater is in a retracted, overhead position;

FIGURE 3 is an enlarged simplified perspective view showing one side of the single head inking/coating apparatus of FIGURE 1 in the operative position;

FIGURE 4 is a simplified side elevational view showing the dual head inking/coating apparatus in the operative coating position for spot or overall coating from the blanket position;

FIGURE 5 is a simplified side elevational view showing the single head inking/coating apparatus in the operative coating position for spot or overall coating from the plate position; and,

FIGURE 6 is a simplified side elevational view of the dual head inking/coating apparatus of FIGURE 4, partially broken away, which illustrates the hydraulic drive assembly and doctor blade assembly.

【書類名】 外国語図面

FIG. 1

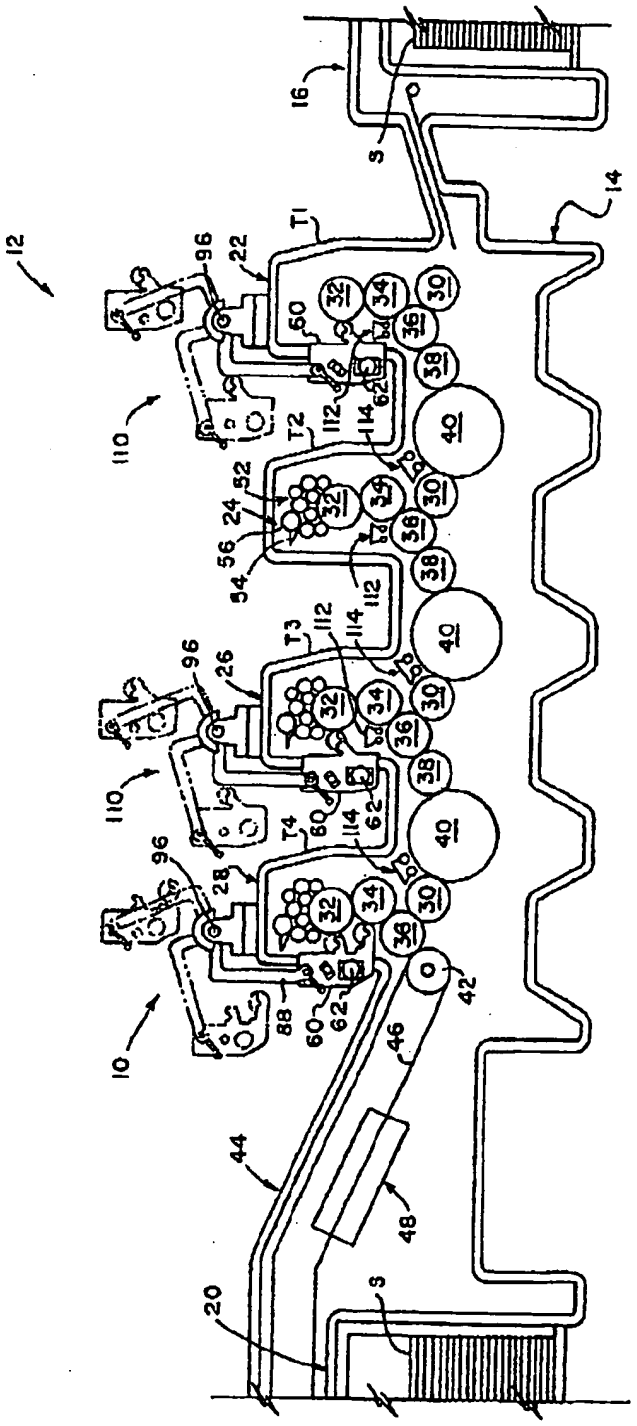


FIG. 2

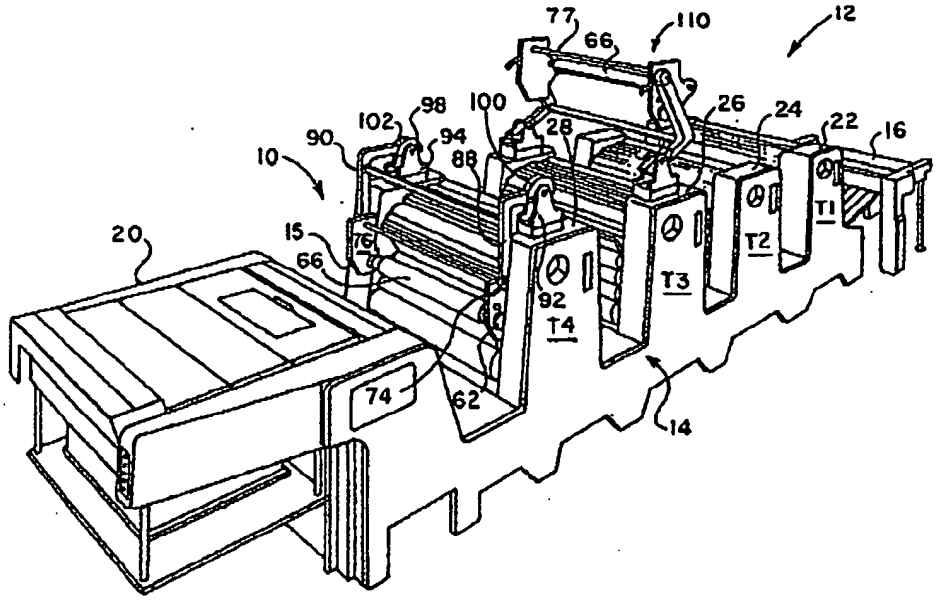

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FIG. 3

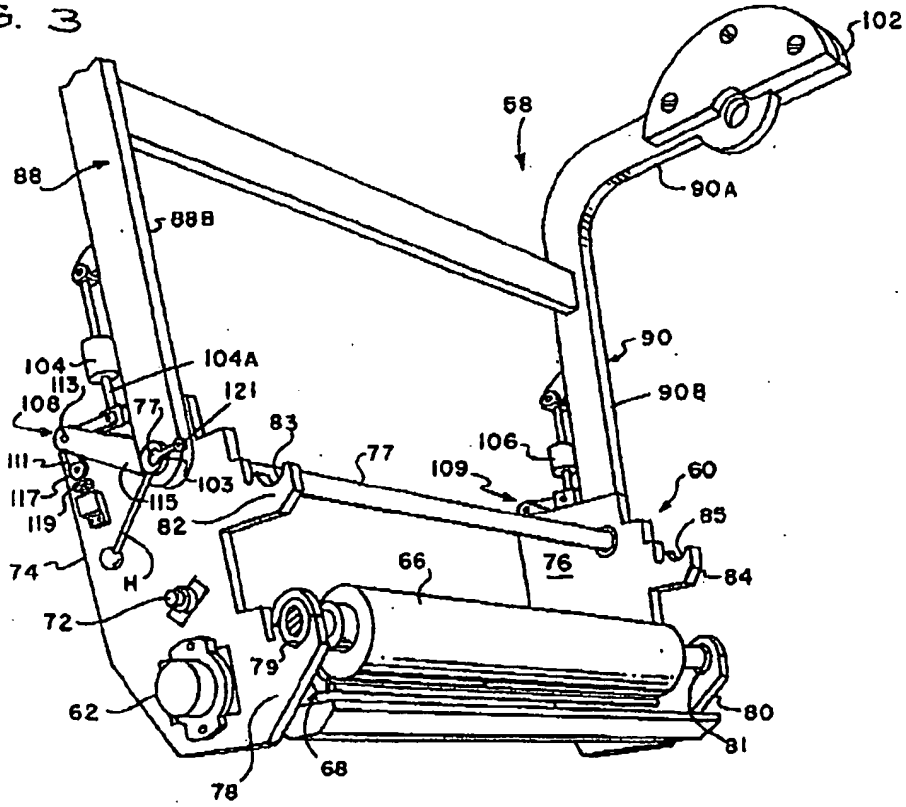
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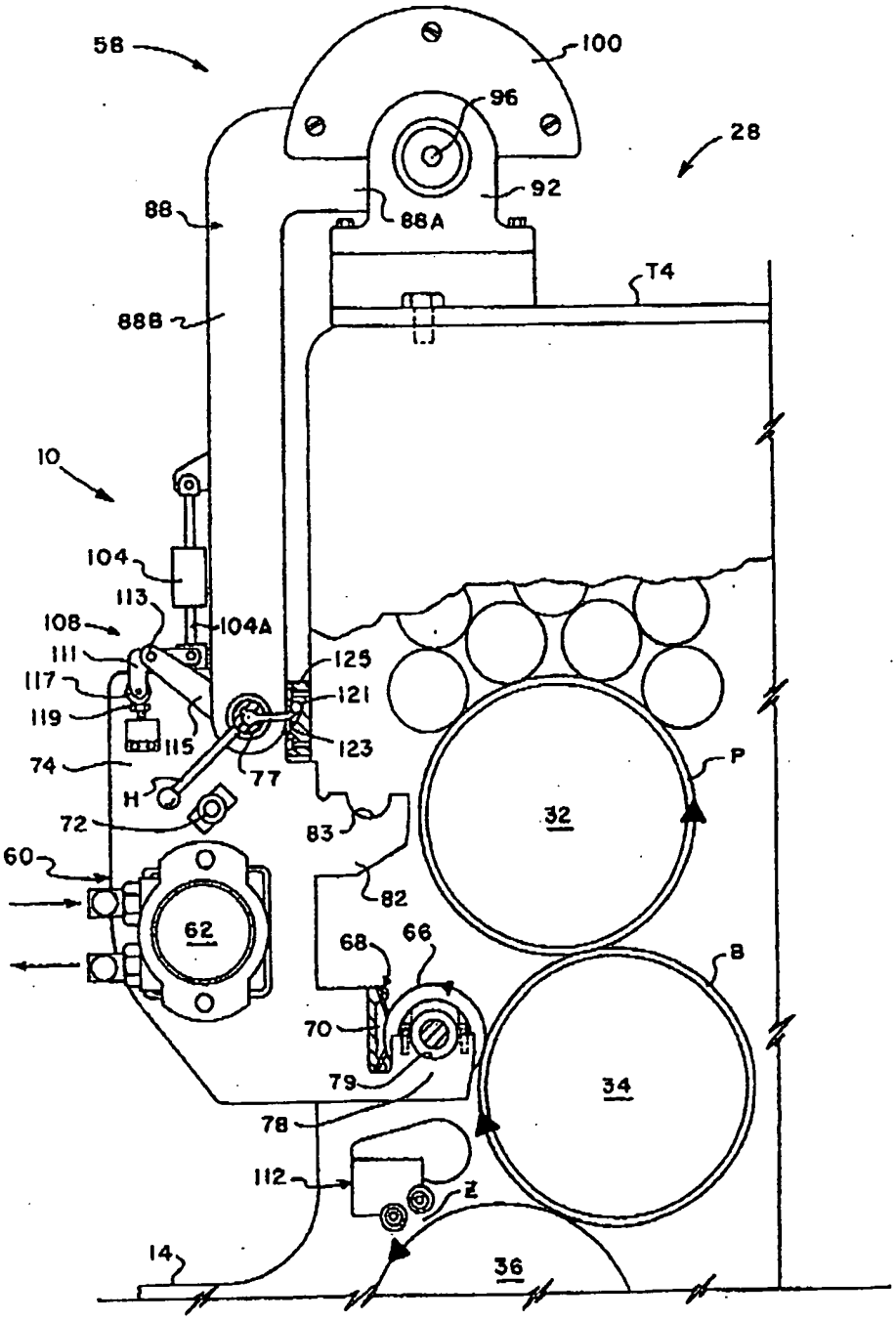
FIG. 4



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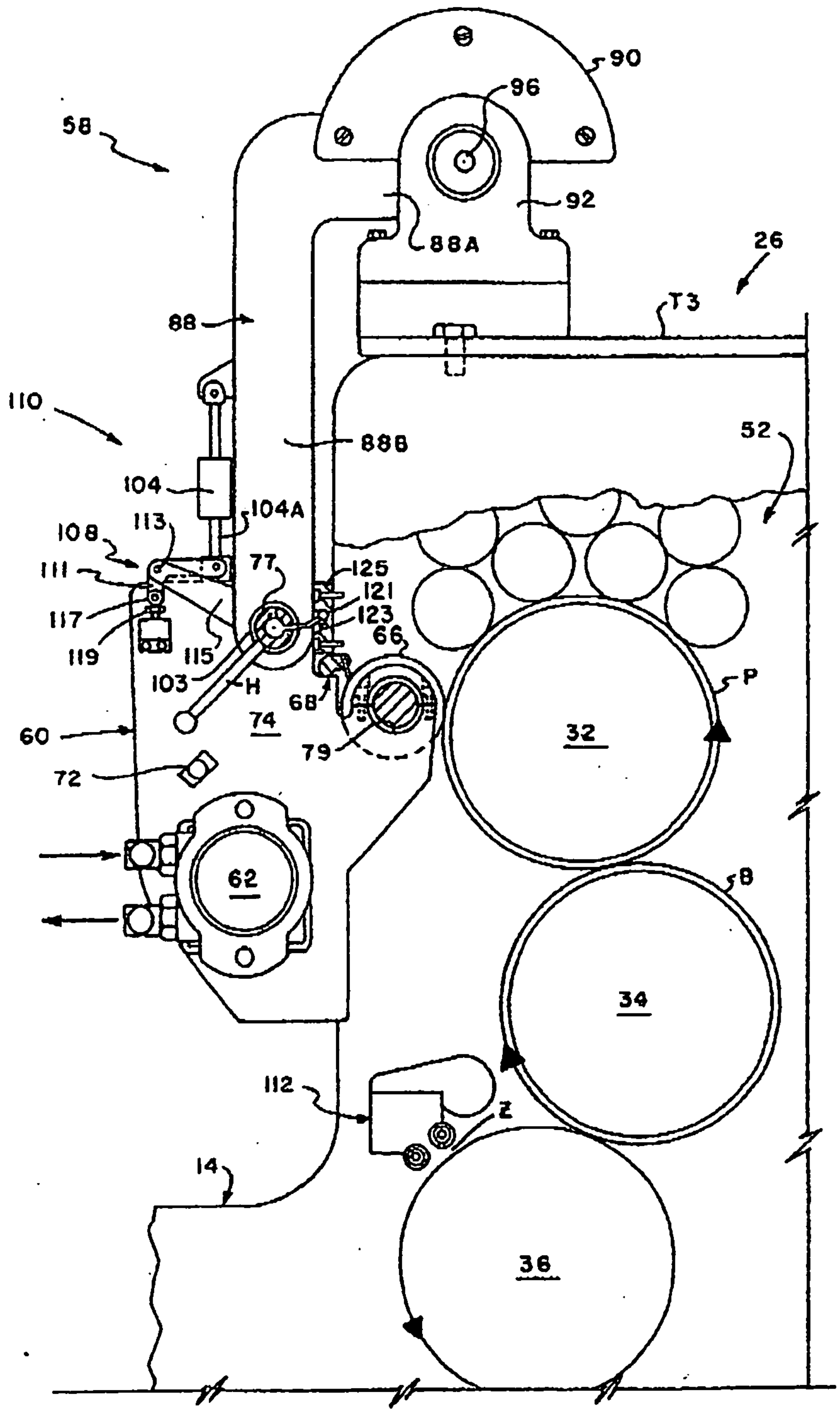
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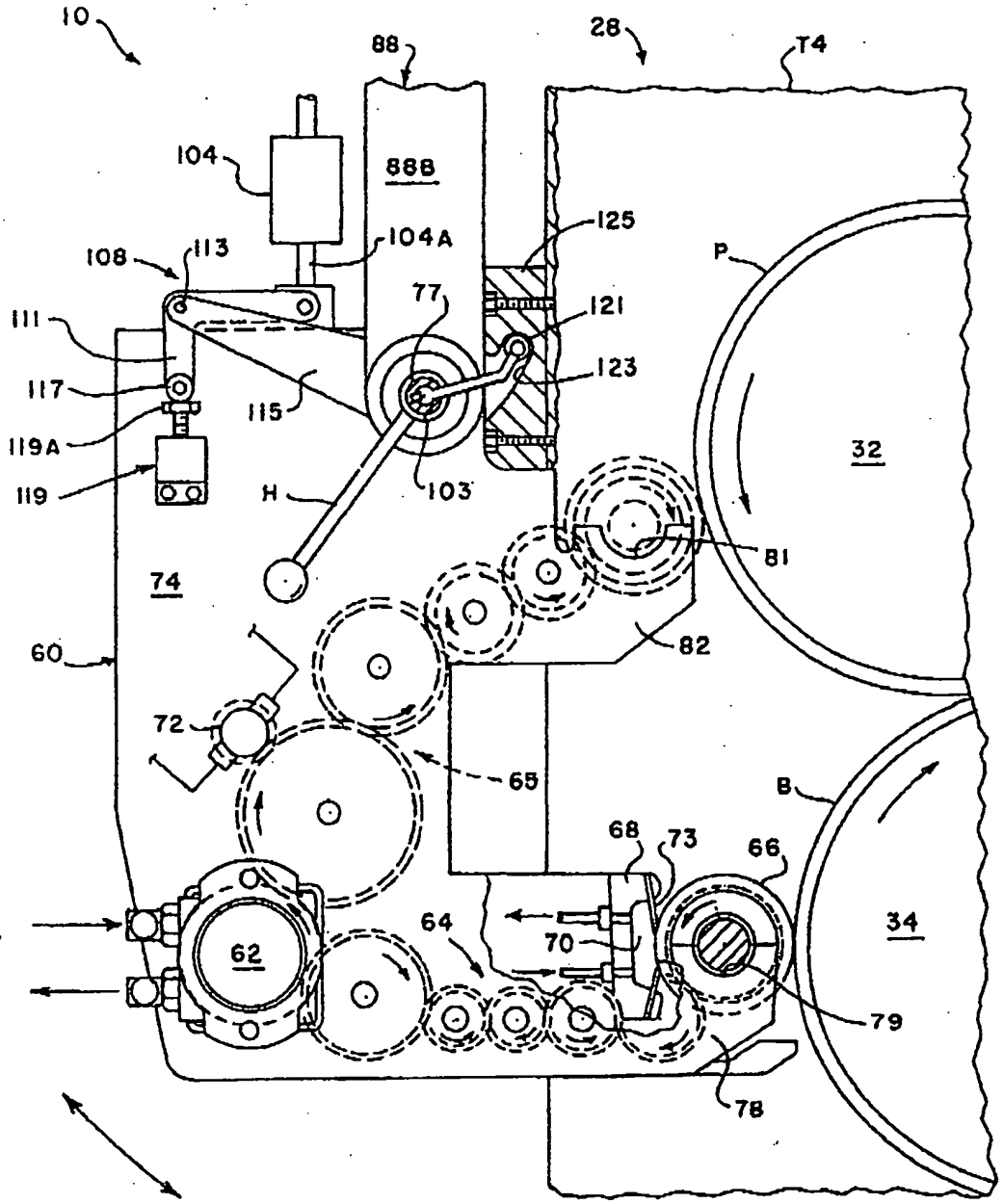
FIG. 6



【書類名】　外国語要約書

1．Abstract

A retractable in-line inking/coating apparatus selectively applies either spot or overall ink/coating material to a blanket or flexographic plate on a blanket cylinder, or spot or overall ink/coating to a flexographic printing plate on a plate cylinder in a rotary offset printing press. The inking/coating apparatus is pivotally mounted on the tower of a printing unit or dedicated coating unit, and is extendable into and retractable out of an inking/coating position by a carriage assembly which is pivotally coupled to the printing unit tower. Because of the pivotal support provided by a cantilevered support arm, the inking/coating apparatus is extended and retracted through a Ferris wheel arc between adjacent printing units.

2．Representative Drawing

FIG. 1

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【提出物件の目録】

　【物件名】　外国語明細書の翻訳文　1

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【物件名】　外国語図面の翻訳文　1

【物件名】　外国語要約書翻訳文　1

【書類名】　明細書

【発明の名称】　印刷ユニット相互間でフェリス運動をする引込み自在なインキング／コーティング装置

【特許請求の範囲】

【請求項１】　版胴、ゴム胴及び圧胴が回転自在に取り付けられた印刷ユニットを備えた形式の印刷機に用いられるインキング／コーティング装置において、インキング／コーティング装置が版胴及びゴム胴に対して作動位置にあるときに、インキ又はコーティング材料を、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに個別又は同時のいずれかで付着させるアプリケータヘッドと、アプリケータヘッドを、アプリケータヘッドが版胴及びゴム胴に横方向に隣接して配置された作動位置に移動させたり、アプリケータヘッドを、アプリケータヘッドが版胴及びゴム胴に対して高い位置にある引込み位置に移動させるキャリジ組立体とを有することを特徴とするインキング／コーティング装置。

【請求項２】　キャリジ組立体は、印刷ユニットに回動自在に取り付けられるよう構成された第１の端部及びアプリケータヘッドに回動自在に結合された第２の端部を備えた支持アームを有し、アプリケータヘッドは、支持アームで支えられた状態で作動位置に移動できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項３】　バランスウェイトは、キャリジ組立体に結合されていることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項４】　アプリケータヘッドは、インキ又は液状コーティング材料を受け入れるリザーバを備えたドクターブレード組立体と、リザーバと連通状態でドクターブレード組立体に結合されたアプリケータローラとを有し、アプリケータローラは、アプリケータヘッドが作動位置にあるときに、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに係合できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項５】　アプリケータローラは、弾性移送面を備えたアニロックスローラであることを特徴とする請求項４記載のインキング／コーティング装置。

【請求項６】　アプリケータヘッドに可動に結合されていて、伸縮自在な動

力伝達アームを備えた動力アクチュエータと、動力伝達アームに結合されていて、動力伝達アームの伸縮運動をキャリジ組立体に対するアプリケータヘッドの回動運動に変換する運動変換装置とを有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項７】　運動変換装置は、動力伝達アームに結合された第１の端部及びアプリケータヘッドに固定された停止部材に係合する第２の端部を備えたベルクランクプレートと、キャリジ組立体に固定されていてベルクランクプレートに回動自在に結合されたクレビスプレートとを含むことを特徴とする請求項６記載のインキング／コーティング装置。

【請求項８】　アプリケータヘッドは、キャリジ組立体に回動自在に結合された第１及び第２のサイドフレーム部材と、第１及び第２のサイドフレーム部材に取り付けられていて、インキ又は液状コーティング材料を受け入れるリザーバを含むドクターブレード組立体と、第１及び第２のサイドフレーム部材にそれぞれ取り付けられたクレードル組立体と、クレードル組立体に回転自在に取り付けられると共にドクターブレード組立体に結合されていて、転動しながらリザーバ内のインキ又はコーティング材料と接触し、アプリケータヘッドが作動位置にあるとき、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに係合できるアプリケータローラと、アプリケータローラに結合されていて、アプリケータローラを回転させる駆動モータとを有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項９】　クレードル組立体は、第１及び第２のサイドフレーム部材にそれぞれ設けられた第１及び第２のソケットを有し、アプリケータローラは、第１及び第２のソケットに回転自在に取り付けられていることを特徴とする請求項８記載のインキング／コーティング装置。

【請求項１０】　クレードル組立体は、第１及び第２のサイドフレーム部材にそれぞれ設けられた第１及び第２のソケットと、第１及び第２のサイドフレーム部材にそれぞれ設けられた第３及び第４のソケットとを有し、アプリケータローラは、アプリケータヘッドが作動位置にあるとき、インキ又はコーティング材料を版又はブランケットのいずれかに付着させるよう第１及び第２のソケット又

は第３及び第４のソケットのいずれかに回転自在に選択的に取り付けることができることを特徴とする請求項８記載のインキング／コーティング装置。

【請求項１１】　アプリケータヘッドは、インキング／コーティング装置が作動位置にあるとき、版に係合できるようアプリケータローラを支持する第１のクレードルと、インキング／コーティング装置が作動位置にあるとき、ブランケットに係合できるようアプリケータローラを支持する第２のクレードルとを有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１２】　キャリジ組立体は、印刷ユニットに回動自在に結合された第１の端部、及び第２の端部を備えた支持アームと、支持アームの第２の端部及びインキング／コーティング装置が回動自在に取り付けられた共通のピボットシャフトと、共通ピボットシャフトと印刷ユニットとの間に結合された雄型及び雌型ラッチ部材とを有し、ラッチ部材のうち一方は、共通ピボットシャフトに固定され、他方のラッチ部材は、印刷ユニットに取付け自在に構成され、ラッチ部材は、アプリケータヘッドが作動位置にあるときに、インターロック係合状態で相互に嵌合できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１３】　アプリケータヘッド及び印刷ユニットは、キャリジ組立体及び印刷ユニットに取り付けられていて、アプリケータヘッドが作動位置にあるときに、キャリジ組立体を印刷ユニットに対してインターロック係合状態に解除自在に係止する雄型及び雌型ラッチ結合部材を有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１４】　キャリジ組立体は、細長いシャンク部分及びハブ部分を有し、細長いシャンク部分は、アプリケータヘッドに回動自在に結合され、ハブ部分は、印刷ユニットに回動自在に取り付けられるよう構成されていることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１５】　第１及び第２の印刷ユニットを有するオフセット輪転印刷機であって、請求項１記載のインキング／コーティング装置が請求項１に記載されているように第１の印刷ユニットに可動に結合されていて、第１の印刷ユニットの圧胴に隣接して第１の印刷ユニットに取り付けられていて、印刷されたばか

りの基材が圧胴と接触しているときに、加熱空気を送風して印刷基材に当てる乾燥装置を有することを特徴とするオフセット輪転印刷機。

【請求項１６】　高温空気、水分及び揮発分を乾燥装置と印刷基材との間の暴露域から除去するためのエキストラクタが、乾燥装置に隣接して配置されていることを特徴とする請求項１５記載のオフセット輪転印刷機。

【請求項１７】　中間渡し胴が、第１の印刷ユニットの圧胴と枚葉紙移送関係をなして結合され、インターステーション乾燥装置が、中間渡し胴に隣接して配置されていて、印刷又は被覆が施されたばかりの基材を第１の印刷ユニットの圧胴から移送したあとであって、中間渡し胴と接触しているときに、加熱空気を送風して基材に当てるようになっていることを特徴とする請求項１５記載のオフセット輪転印刷機。

【請求項１８】　第１及び第２のオフセット輪転印刷ユニットを含む形式の印刷機で、少なくとも第１の印刷ユニットの作動中に水性又は紫外線硬化性印刷インキマニホルド湖はコーティング材料を用いてオフセット輪転印刷をする方法において、版を水性インキ／水性コーティング材料又は紫外線硬化性インキ／紫外線硬化性コーティング材料によりスポット又はオーバーオール状態でコーティングし、ブランケットを水性インキ／水性コーティング材料又は紫外線硬化性インキ／紫外線硬化性コーティング材料によりスポット状態であると共に、或いはオーバーオール状態でコーティングし、印刷インキ又はコーティング材料を印刷版からブランケットに転移し、基材が圧胴とブランケットとの間のニップを通って移送されているときに、インキング又はコーティングされた画線をブランケットから基材に転移し、基材が次の処理を施される前に、印刷基材上のインキ又はコーティング材料を乾燥させ、上記工程を各印刷ユニットで連続して実施することを特徴とするオフセット輪転印刷方法。

【請求項１９】　乾燥工程では、印刷／被覆が施されたばかりの基材が第１の印刷ユニットの圧胴と接触しているときに高速加熱空気を送風して基材に当てることを特徴とする請求項１８記載のオフセット輪転印刷方法。

【請求項２０】　印刷基材を第１の印刷ユニットから中間渡し胴に移送し、印刷基材が中間渡し胴と接触しているときに印刷基材を乾燥させることを特徴と

する請求項１８記載のオフセット輪転印刷方法。

【請求項２１】　印刷／被覆が施されたばかりの基材が圧胴と接触しているときに基材上の暴露域から高温空気、水分及び揮発分を除去することを特徴とする請求項１８記載のオフセット輪転印刷方法。

【請求項２２】　水性コーティング材料又は紫外線硬化性コーティング材料のプライマーコーティングを第１の印刷ユニット内で基材に施し、基材が第２の印刷ユニット内で処理される前に、基材上のプライマーコーティングを乾燥させることを特徴とする請求項１８記載のオフセット輪転印刷方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】

本発明は、枚葉紙又は巻取紙オフセット輪転又はフレキソ印刷機に関し、特に、印刷インキ又は保護若しくは装飾用コーティングを枚葉紙（シート紙）基材又は巻取紙基材にインライン方式で付着させる新規且つ改良型のインキング／コーティング装置に関する。

【０００２】

【従来の技術及び発明が解決しようとする課題】

従来型枚葉紙オフセット輪転印刷機は典型的には、一又は二以上の印刷ユニットを含み、これら印刷ユニットを通して個々の枚葉紙を送り、濡れたインキで印刷する。オフセット輪転印刷機で用いられるインキは代表的には、印刷後しばらくは濡れてくっつく状態のままなので、印刷されたばかりの枚葉紙（以下、「印刷枚葉紙」ともいう）を或る一つの印刷ユニットから別の印刷ユニットに移送しているときや枚葉紙デリバリースタッカに搬送しているときに、印刷枚葉紙にマークや汚れが付かないようにするために特別の予防策を講じる必要がある。印刷枚葉紙の印刷面は比較的ゆっくりと乾燥し、次に行われる印刷ユニット間の移送中に汚れの付く場合がある。汚れ付着及び裏移りを減少させるために、スプレーパウダが印刷枚葉紙に施される。

【０００３】

印刷用途によっては、保護及び／又は装飾用コーティングを印刷されたばかり

の枚葉紙の全面又は一部に施すことにより裏移り及び汚れ付着を防止する。保護又は装飾用コーティングを施すための種々の構成が、印刷機の最後の印刷ユニットをコーティング付着ユニットとして用いることによりインライン方式として提案された。しかしながら、かかるインライン方式のコーティングを施す場合、最後の印刷ユニットを、インキを枚葉紙に付着させるのに使用することはできず、コーティング作業にしか利用することができない。かくして、これらの形式のインライン型コーティング装置を用いてコーティングを行っている間、最後の印刷ユニットはコーティングユニットになるので、印刷機はその全ての色の印刷を行うことが出来ない。

【０００４】

印刷機をコーティング又は非コーティングを行うよう再構成するのに必要な時間は非生産的であってコストがかかることは理解されよう。したがって、一回の印刷作業を終えて掃除し、次の仕事をセットアップして運転する時間を最小限に抑えるインライン型コーティング装置（塗工機）が要望されている。連続的な仕事において同一タイプのコーティング、特にブランケットによるコーティングが必要とされる場合、仕事と仕事の間で塗工機を掃除する必要はない。しかしながら、コーティング材料がローラ上で乾燥するようになることはない。したがって、特にブランケットからスポットコーティングへの、或いはこの逆の切換えの際、或いは、もし仕事と仕事の間に遅れがあれば、各仕事を完了させる度に塗工機を洗浄することが必要である。

【０００５】

加えて、異なるコーティング組成物の間、例えば水性コーティングと紫外線硬化性コーティングの間で切り換える際、塗工機の洗浄が必要である。かかるコーティング材料は互換性がなく、その結果、異なるコーティング媒体の付着にあたり塗工機を洗浄しなければならない。

【０００６】

【課題を解決するための手段】

本発明によれば、上記の欠点は、インキング／コーティング作動位置と引込みオーバーヘッド遊び位置との間でフェリスホイール回動運動（Ferris wheel mov

ement)を行うよう印刷ユニットに取り付けられた引込み自在なインライン型インキング／コーティング装置により解決される。インキング／コーティング装置は、片持ち支持アームを含むキャリジ組立体により版胴又はゴム胴のいずれかと整列して位置決めされるアプリケータヘッドを含む。支持アームは、インキング／コーティングヘッドと印刷ユニットタワー部との間に回動自在に結合される。この片持ち方式の回動取付け構造により、インキング／コーティングユニットを２つの印刷ユニット間で使用できるだけでなく、印刷機の最後の印刷ユニットについても使用できる。

【０００７】

好ましい実施例では、アプリケータヘッドは、垂直方向に間隔を置いて位置した対をなすクレードル部材を含み、キャリジ組立体が作動位置になるとき、一方のクレードル対は、金属又はセラミックコーティングローラをゴム胴と整列した状態に支持し、他方のクレードル対は、弾性アニロックスコーティングローラを版胴と整列した状態に支持するようになっている。支持アームにより片持ち方式回動支持手段が構成されるので、アプリケータヘッドを、隣り合う印刷ユニット間の限定されたスペース内において、フェリスホイール運動と類似した形態で円弧を描いて昇降させることができる。完全引込み状態では、アプリケータヘッド及びキャリジ組立体は、高い引込みオーバーヘッド位置、好ましくは印刷ユニットタワー部の上に位置するオーバーヘッド位置まで持ち上げられ、かくして印刷ユニットの印刷能力を失わせないで、インターステーション空間及び印刷ユニットの胴へょ完全な接近を得ることができる。アプリケータヘッドのインキング／コーティングアプリケータローラの点検、クリーニング又は交換をすることができ、また、インキング／コーティング装置が引込み位置にあるときに、ドクターブレード組立体の洗浄を自動的に行うことができる。

【０００８】

インキング／コーティング装置をフレキソ印刷版及び水性インキ又は水性コーティングと組み合わせて用いると、印刷されたばかりの枚葉紙上の水性インキ又はコーティングの水成分は、高速高温空気インターステーション乾燥装置及び大容量熱及び水分エキストラクタ（除去又は抽出装置）組立体によって蒸発し、印

刷直後のインキ又はコーティングは、枚葉紙が次の印刷ユニットで印刷される前に、完全に乾くようになる。この迅速なフレキソ印刷／コーティング乾燥構成により、インキのベースコート、例えばオペークホワイト又は金属粉インキ（金、銀その他の金属類）を第１の印刷ユニットで付着させ、そして次の印刷ユニットで平版印刷法でオーバープリントすることができる。

【０００９】

【発明の実施の形態】

本明細書で用いる「処理（された）」という用語は、基材のいずれか一方の面に施される種々の印刷プロセスを言い、かかる印刷プロセスは、紫外線硬化性で水性のインキ及び／又はコーティング（被膜）の付着を含む。「基材」という用語は、枚葉紙（シート紙）又は巻取紙を差す。また、本明細書では、「乾式印刷版（waterless printing plate）」という用語は、疎油性の非画線部及び親油性の画線部を備えた印刷版を意味し、非画線部は、水性インキの表面張力よりも小さな表面張力値を有し、画線部は、水性インキの表面張力よりも大きな表面聴力値を備えていることを特徴とする。「フレキソ」という用語は、水性インキ又は水性コーティング材料で濡らすことができるレリーフ面（凸版面）を備えた可撓性の印刷版を意味する。

【００１０】

例示の図面に示すように、本発明は、全体を符号１２で示している枚葉紙又は巻取紙オフセット輪転又はフレキソ印刷機で印刷された枚葉紙又は巻取紙にインキ又は保護及び／又は装飾用コーティングを施すための新規且つ改良型のインライン型インキング／コーティング装置１０に具体化されている。この場合、図１に示すように、インキング／コーティング装置１０は、「ハイデルベルグ・スピードマスター（Heiderberg Speedmaster 102V)」という商品名でドイツ国のハイデルベルガー・ドルクマシーネン・アクチェンゲゼルシャフトによって製造されているような４色印刷機１２内に設置されている。印刷機１２は、右側の端部が符号Ｓで示されている枚葉紙を一枚ずつ次々に印刷機内に送り込む給紙装置１６に、反対側の端部が印刷されたばかりの枚葉紙を集めて積み重ねるデリバリー（排紙装置）スタッカ２０にそれぞれ結合した機枠又はフレーム１４を含む。給紙

装置１６とデリバリースタッカ２０との間には、４つの実質的に同一の輪転印刷ユニット２２，２４，２６，２８が設けられており、これら印刷ユニットは、枚葉紙が印刷機内を通って移動しているときに枚葉紙上に異なる色のインキを印刷することができる。印刷ユニットは、サイドフレーム部材１４，１５によって形成される印刷タワー部Ｔ１，Ｔ２，Ｔ３，Ｔ４内に納められている。

【００１１】

図示のように、印刷ユニット２２，２４，２６，２８は実質的に同一であって従来設計のものである。第１の印刷ユニット２２は、インフィード渡し胴３０、版胴３２、ゴム胴３４及び圧胴３６を含み、これらは印刷機のサイドフレーム１４，１５間に互いに平行な整列状態で回転自在に支持されている。最初の３つの印刷ユニット２２，２４，２６は各々、印刷枚葉紙を隣の圧胴からインターステーション渡し胴４０を経て次の印刷ユニットに送り渡すよう設けられたインターユニット渡し胴３８を有する。最後の印刷ユニット２８は、印刷枚葉紙１８を最後の圧胴３６からデリバリーコンベヤシステムに移送する際に各印刷枚葉紙１８を枚葉紙デリバリースタッカ２０に案内するデリバリー紙取り胴４２を備えた状態で示されている。

【００１２】

図２に示されているようなデリバリーコンベヤシステム４４は、従来設計のものであって、印刷されたばかりの枚葉紙１８が最後の印刷ユニット２８の紙取り胴４２と圧胴３６との間のニップを出た後、その前縁を加えるためのクリッパ（加え爪）を有する横方向に配置されたグリッパ棒を備える一対の無端デリバリーグリッパチェーン４６を有する。印刷シート紙の前縁がグリッパによって把持されると、デリバリーチェーン４６は、枚葉紙を圧胴３６から引き離し、そして印刷枚葉紙を枚葉紙デリバリースタッカ２０に搬送する。

【００１３】

印刷されたばかりであると共に、或いはコーティングが施されたばかりの枚葉紙Ｓは、デリバリー枚葉紙スタッカに到達する前に、デリバリー乾燥装置４８の下を通過し、このデリバリー乾燥装置４８は、赤外線熱放射と高温高速空気流と熱及び水分除去方式との組合わせである。

【0014】

図１に示す例示の形態では、第１の印刷ユニット２２は、フレキソ印刷版を備えていて、インキングローラ列又はダンプニング装置を必要としない。もしインキングローラ列が第１の印刷ユニットに取り付けられている場合、インキ着け（フォーム）ローラは、印刷ユニットが刷りを行うと引っ込められてオフ状態にロックされる。フレキソ水性インキは、インキング／コーティングユニット１１０によって供給される。残りの印刷ユニット２４，２６，２８は、平版印刷できるように装備されており、これら印刷ユニットはインキをインキ壷５４から版胴３２に移すよう配置されたインキングローラ列５２を備えたインキング装置５０を含む。これは、インキ出しローラ５６及び壷ローラによって達成される。インキ出しローラ５６はインキ壷５４内に突出し、その表面は印刷インキＱで濡れる。印刷インキＱは壷ローラによって間欠的にインキングローラ列５２に移される。インキングローラ列５２は印刷インキＱを版胴３２の印刷版Ｐの画線部に供給する。

【0015】

印刷インキＱは、印刷版から、ゴム胴３４に取り付けられているインキ受容ブランケットＢに転移される。ブランケットＢ上に担持されたインキ付き画線は、枚葉紙が圧胴３６とブランケットＢとの間のニップ中に移送されると枚葉紙Ｓに転移される。

【0016】

図１に示すインキングローラ装置５２は、平版（lithographic）インキ印刷版と組合わせて用いる場合の例示である。ダンプニングローラ（図示せず）は平版Ｐに直接係合するが、印刷ユニット２２のフレキソ版と併用されないことは理解されよう。

【0017】

次に、図４、図５、図６を参照すると、インライン型インキング／コーティング装置１０は、アプリケータヘッド６０を支持するキャリジ組立体５８を含む。アプリケータヘッド６０は、油圧モータ６２、下部歯車列６４、上部歯車列６５、アプリケータローラ６６及びドクターブレード組立体６８を含む。アプリケー

タローラ６６の外周面はリザーバ７０に入っている液体コーティング材料又はインキと直接接触して濡れるよう挿入される。リザーバ７０には、インキ又はコーティング材料が連続的に供給され、このインキ又はコーティング材料はリザーバ７０を通ってポンプ（図示せず）によって印刷機外部に設けられた源から循環される。油圧モータ６２は印刷機駆動装置（図示せず）からのＲＰＭ制御信号及びタコメータ７２によって生じるフィードバック信号に応答して版胴３２及びゴム胴３４と同期してアプリケータローラ６６を駆動する。油圧駆動モータが好ましいが、電気駆動モータを使用してもよい。

【００１８】

アプリケータローラ６６は好ましくは、測定した量の印刷インキ又はコーティング材料を印刷版又はブランケット上に転移させる流量測定アニロックスローラである。アニロックスローラの表面には、「セル」と称する列状の密に間隔をおいた浅い窪みが彫刻により設けられている。リザーバ７０からのインキ又はコーティング材料は、アニロックスローラがリザーバ中を回転するとセル内に流れ込む。アニロックスローラの転移面はドクターブレード７３によって、過剰のインキ又はコーティング材料がかき落とされる。アニロックスローラ上に残っているインキ又はコーティング材料は、セル内に入る所定の測定量である。

【００１９】

アプリケータローラ６６は円筒形であり、種々のサイズ及び形状のセルを含む種々の直径及び長さで構成できる。アニロックスローラの体積容量は、製造中に決められ、セルのサイズ、形状及び単位面積当たりのセルの数の選択に応じて決まる。意図した用途に応じて、セルパターンは、細かくても（単位面積当たり多くの小さなセル）又は粗くても（単位面積当たり少ない数の大きなセル）よい。

インキ又はコーティング材料をインキング／コーティングアプリケータヘッド６０を介して付着又は塗布することにより、平版印刷ユニットのインキングローラ列と比較して、より多くの量のインキ又はコーティング材料を枚葉紙Ｓに与えることができる。さらに、色の純度が高くて一層輝きがある。というのは、フレキソインキは、平版印刷法によって得ることができる塗り厚よりもはるかに厚い

塗り厚で塗布され、湿し溶液によって稀釈されることはないからである。

【００２０】

インキング／コーティングアプリケータヘッド６０は、アプリケータローラ６６、歯車列６４、歯車列６５、ドクターブレード組立体６８及び駆動モータ６２を支持するサイドフレーム部材７４，７６を含む。アプリケータローラ６６は、両端部が一対のエンドプレート７８，８０によって形成される下方クレードル上に支持され、これらエンドプレート７８，８０はアプリケータローラ６６をゴム胴３４と平行な整列関係に保持している（図５）。また、サイドフレーム７４，７６は、下方サイドプレート７８，８０に関して垂直方向に間隔をおいて設けられた一対のサイドプレート８２，８４によって形成される上方クレードルを備えている。各クレードルは、アプリケータローラ６６を、版胴３２に取り付けられた版Ｐ（図４）又はゴム胴３４に取り付けられたブランケットＢに密着してスポット状態のコーティング又はインキングを行うことができるよう保持するための一対のソケット７９，８１及び８３，８５をそれぞれ有している。

【００２１】

好ましくは、上方クレードル（プレート）位置についてのアプリケータローラ６６は、弾性転移面を備えたアニロックスローラである。デュアルクレードル構成では、印刷機のオペレータは、最少限の印刷機の運転停止時間でブランケットのインキング／コーティング及び版のインキング及びコーティングから素早く切り換えることができる。というのは、もしインキからコーティング材料へ、或いはその逆にしようとする場合、必要なことは、アプリケータローラ６６を取り外して再位置決めし、又はこれを交換し、そしてドクターブレード組立体を洗浄することだけである。フレキソモード又は平版モードのいずれかで選択的に動作し、版又はブランケット位置のいずれか一方から印刷又は被覆を行うことができることを本明細書では「リソフレックス（LITHOFLEX ）」法と呼ぶ。

【００２２】

再び図２及び図３を参照すると、アプリケータヘッド６０はキャリジ組立体５８によって片持ち回動方式で支持され、この片持ち回動構成により、デュアルクレードル型インキング／コーティング装置１０及び単一クレードル型インキング

／コーティング装置１１０を、任意の２つの隣り合う印刷ユニット間で用いることができるだけでなく、印刷機の最初と最後のユニットについて使用することもできる。これを可能にするのは、ピボットシャフト７７でサイドプレート又はサイドフレーム部材７４，７６に回動自在に結合された一対の片持ち支持アーム８８，９０である。各支持アームはハブ部分８８Ａ，９０Ａ及び細長いシャンク部分８８Ｂ，９０Ｂを有する。

【００２３】

片持ち支持アームは、ピボットブロック９２，９４によって印刷タワー部に回動自在に取り付けられている。ハブ部分８８Ａ，９０Ａは、ピボットシャフト９６，９８で回転自在に支承されている。ピボットブロック９２，９４はタワー部１４Ｄに固定されていて、キャリジ組立体５８は片持ちフェリス（Ferris）支持方式でピボットシャフト９６，９８から回動自在に吊り下げられるようになっている。シャンク部分８８Ｂ，９０Ｂはピボットシャフト７７に回動自在に結合されていて、キャリジ組立体５８及びアプリケータヘッド６０は、互いに且つピボットシャフト７７に対して独立して回転をすることができるようになっている。この構成では、アプリケータヘッド６０はピボットシャフト７７から回動自在に吊り下げられ、支持アームが作動位置から完全引っ込み位置へ、或いはその逆方向に回転する間、直立の向きを保つ。

【００２４】

かくして、クレードル７８，８０，８２，８４は、アプリケータヘッドが例えば図４及び図５に示すように作動位置に伸長されると、アプリケータローラ６６を版胴又はゴム胴と垂直且つ水平な整列関係をなすよう位置決めする。さらに、支持アームのハブ部分とシャンク部分が互いに横方向に位置する関係にあるので、アプリケータヘッド６０及びキャリジ組立体５８は、隣り合う隣接の印刷タワー部に触れることなく、フェリス動作の回転円弧運動を行うことができる。これにより、インキング／コーティング装置１０を任意の中間の印刷ユニットタワー部（Ｔ２，Ｔ３）だけではなく、最初の印刷ユニットタワー部Ｔ１及び最後の印刷ユニットタワー部Ｔ４にも設置することができる。そのうえ、インキング／コーティングユニット１０が作動位置にある時、印刷ユニット間のインターステー

ション空間内へのアプリケータヘッド６０の横方向の突出の度合が最少限に抑えられる。これにより、アプリケータヘッドが作動位置になっているとき、オペレータが事実上制約を受けないで、隣り合う印刷ユニット間のインターステーション空間に接近することができ、またキャリジ組立体５８が引っ込められている状態では全く制約のない接近が可能となる。

【００２５】

キャリジ組立体５８の回転の向きは、引込み不作動（遊び）位置（図１に想像線で示す）から作動位置（図４及び図５）へ反時計回りである。キャリジ組立体５８は、版及びブランケットへの接近がダンプニング装置のローラ等によって制限されないと仮定すれば、引込み位置から作動位置へ時計回りに回転してアプリケータローラをタワー部のダンプニング装置側の版又はブランケットのいずれかに係合させることができるよう改造が可能である。

【００２６】

支持アーム８８，９０は、ピボットブロック９２，９４に対して同時に回転するよう支持アームに固定されたバランスウェイト１００，１０２によって回転動作しやすくなる。動力を用いず、バランスウェイトを用いて回転しやすくする構成になっているので、印刷機のオペレータはインキング／コーティング組立体１０を図４に示すような係合動作位置から図１に想像線で示すような完全引っ込み不作動位置に容易に移動させることができる。好ましくは、キャリジ組立体５８は、ねじりバネ、電気モータ又は油圧モータを用いると、回転しやすくなる。

【００２７】

インキング／コーティング装置１０は、支持アーム８８，９０を印刷ユニットタワー部Ｔ４の印刷機のサイドフレーム１４，１５にそれぞれ作動位置で固定する開放自在なラッチカップリング１０３，１０５によって図４に示すように作動位置に解除自在に係止される。ゴム胴３４へのアプリケータローラ６６のコーティング動作での係合は、動力アクチュエータ、好ましくは伸縮自在な動力伝達アーム１０４Ａ，１０６Ａを備えた空気圧シリンダ１０４，１０６によってもたらされる。空気圧シリンダ１０４はピボット式リンク装置１０８によって支持アーム８８に回動自在に結合され、第２の空気圧シリンダ１０６はピボット式リンク

装置１０９によって支持アーム９０に回動自在に結合されている。空気圧シリンダ１０４，１０６の作動に応答して、動力伝達アームは引っ込められる。動力伝達アームが引っ込むと、インキング／コーティングヘッド６０はピボットシャフト７７を中心として反時計回りに回転し、かくしてアプリケータローラ６６をゴム胴３４にコーティングのために係合させる。

【００２８】

ピボット式リンク装置１０８は、ピン１１３で回動運動自在に取り付けられたベルクランク１１１を含む。ピン１１３は、支持アーム８８に取り付けられたクレビスプレート１１５によって支持される。ベルクランクの一端はアクチュエータアーム１０４Ａに回動自在に結合され、カムローラ１１７がその反対側の端部に回転自在に取り付けられている。

【００２９】

カムローラ１１７は、サイドプレート７４にしっかりと固定されている可調式のストップ又は停止部材１１９に係合できる。ハンドルＨを反時計回りにシフトさせることにより、カムフォロア１２１は、カムローラ１１７がインターロック作動位置で可調式停止部材１１９に係合すると、レシーバブロック１２５のラッチポケット１２３内に入る。図４、図５及び図６を参照すると、レシーバブロック１２５は、止めネジによって印刷ユニットタワー部のデリバリー側に固定されている。

【００３０】

版Ｐが刷りを行うと、動力が空気圧アクチュエータ１０４に及ぼされ、動力伝達アーム１０４Ａが引っ込み、かくしてベルクランク１１０がピン１１３の回りに反時計方向に回転する。空気圧アクチュエータ１０４によって及ぼされたトルクは、カムローラ１１７及び可調式停止部材１１９を介してアプリケータヘッド６０に伝達される。支持シャフト７７に対するアプリケータヘッド６０の反時計回りの動作により、アプリケータローラ６６は版Ｐと係合するようになる。

【００３１】

可調式停止部材１１９は、カムローラ１１７と係合できる螺設ボルト１１９Ａを有する。打撃係合点はあらかじめ設定されていて、アプリケータローラ６６は

、アプリケータヘッド６０が印刷機フレーム１４とインターロックすると共に印刷ユニットが刷りを行うと、作動位置にある版Ｐ又はブランケットＢと係合するよう正しく位置決めされるようになる。

【００３２】

図５を参照すると、単一のヘッドを備えたインキング／コーティング装置１１０が示されている。この変形例の構成は、デュアルヘッド構成に関する全ての点において同一であり、異なるところは単一の歯車列及びアプリケータローラを保持するための単一のクレードルしか用いられていないことである。両方の実施例において、インキング／コーティングヘッド６０は、フェリスホイールの動作と比べて円弧を描いて揺動しているとき直立の状態を保つ。インキング／コーティングヘッド６０は伸長位置と引込み位置との間で動いているときに直立に向くので、印刷ユニットタワー部間の通常のプラットホーム間隔により、キャリジ組立体５８の伸縮を可能にする適当な隙間が得られ、この場合オペレータによる印刷ユニットへの接近を妨害しない。このことは、インライン型インキング／コーティング装置１０が任意の隣り合う印刷ユニット間のインターステーション空間内で有効に動作し、インキング／コーティング装置が引込み位置（図１に想像線で示す）にあるとき、印刷ユニットの各種胴への接近を妨害しないという点において著しい利点を奏する。

【００３３】

さらに、インライン型インキング／コーティング装置が完全引込み位置にある時、アプリケータローラ６６は有利には、印刷ユニットのダンピング装置側に位置決めされ、点検、掃除又は交換が可能となる。その上、ドクターブレード組立体は又、有利には、点検、取外し、調整又は掃除のために位置決めされる。また、ドクターブレードリザーバ及びコーティング循環ラインは、印刷機の運転中に、且つ印刷機が一種類のインキまたはコーティング材料から別のタイプに切り換えるために運転停止しているときにクリーニングが可能となる。

【００３４】

インキング／コーティング装置が水性インキまたは水性コーティング材料を付けるのに用いられる場合、印刷されたばかりの枚葉紙Ｓ上の水分は、図１、図４

及び図５に示すような高速高温空気インターステーション乾燥装置と大容量熱及び水分エキストラクタ（extractor)から成るユニット１１２，１１４によって蒸発させられる。乾燥装置／エキストラクタユニット１１２，１１４は、印刷及びコーティングが施されたばかりの枚葉紙がインターユニット渡し胴３６及び中間渡し胴４０によって移送されているとき、高速加熱空気を枚葉紙上に当てるよう差し向けられている。この構成により、印刷されたばかりの水性インキ又はコーティング材料は、枚葉紙が次の印刷ユニット内でオーバープリント又は重ね刷りをされる前に完全に乾く。

【００３５】

高速高温空気乾燥装置と高性能熱及び水分エキストラクタのユニット１１２，１１４は、各印刷枚葉紙の表面にくっついている湿り空気層を粉砕して飛び散らす高速空気ジェットを利用する。各乾燥装置内では、高速空気は、空気デリバリーバッフル管内の抵抗加熱要素を横切って流れるときに高温に加熱される。高温空気の高速ジェットは、印刷及びコーティングが施されたばかりの枚葉紙Ｓが渡し胴３６及び中間渡し胴４０によって移送されているときに、暴露域Ｚ（図４及び図５）の多数の空気流通穴を通って送りだされて印刷及びコーティングが施されたばかりの枚葉紙Ｓに当てられる。各乾燥装置組立体は、図４及び図５に示すように互いに間隔をおいて並置関係にある一対の空気デリバリー乾燥装置ヘッドを含む。

【００３６】

印刷されたばかりの枚葉紙の各々から取り除かれた高速高温の水分含有空気は、大容量エキストラクタによって乾燥機の暴露域Ｚから抽出され、そして印刷ユニットから完全に排出される。各エキストラクタヘッドは、乾燥装置ヘッドに結合されたマニホルドを含み、水分、揮発分及び高速高温空気を乾燥装置ヘッド間の長さ方向隙間を通して引き出す。この構成によれば、各印刷枚葉紙は、次の印刷ユニットを通して移動する前に乾燥させられる。

【００３７】

フレキソ印刷で用いられる水性インキは、インターステーション高速高温空気乾燥装置／エキストラクタ１１２，１１４によって得られる比較的適度な乾燥温

度で乾燥する。その結果、印刷の品質は実質的に改善される。というのは、水性インキは次の印刷ユニットに入る前に印刷ユニットごとに乾燥するからである。さらに、次の印刷ユニットのブランケット上でのバックトラッピング（back-trapping)が完全に無くなる。このインターステーション乾燥構成により、水性インキ、例えば金属粉インキ及びオペークホワイトインキを一つの印刷ユニットでプリントでき、そして次の印刷ユニットでオーバープライント又は重ね刷り処理を行うことができる。

【００３８】

また、この構成により、第１の印刷ユニットを、水性コーティングを低品質の紙、例えば再生紙に施すコーター（塗工機）として使用でき、またダスト、スプレーパウダー及び他のデブリをインラインで捕捉してシールし、次の印刷ユニットでオーバープリントできる一層平滑で丈夫な表面を得ることができるファーストダウンコーティング（first down coating）は、低品質で粗い基材の表面をシールし、裏抜け（ストライクスルー）及び透き通し（ショースルー）を防止しながらオーバープリントされたドットの鮮明度又はデフィニション（definition）を改善する。紫外線硬化性の保護及び／又は装飾用コーティングを最後の印刷ユニット内でファーストダウンオーバープリントされた（水性）コーティングの上に施すことができる。

【００３９】

好ましくは、アプリケータローラ６６はコーティング材料をゴム胴３４上のブランケットＢに付着させるのに用いられる場合、金属又はセラミックで構成される。アプリケータローラ６６を版に適用する場合、好ましくはこれはフレキソ印刷版に係合する弾性移送面を備えたアニロックスローラとして構成される。適当な弾性ローラ表面材料として、Buna N形合成ゴム及びＥＰＤＭ（ターポリマーエラストマー）がある。

【００４０】

インキング／コーティング装置１０は、広範な種々のインキを付着させることができることが理解されよう。このインキは、蛍光剤（Day Glo ）、パールエッセンス、金属粉類（金、銀その他の金属）、光輝顔料又は光沢剤、スクラッチア

ンドスニッフ (scratch and sniff) (マイクロカプセル化された芳香剤)、スクラッチアンドレビール (scratch and reveal)、発光顔料、感圧接着剤等を含む。

【0041】

印刷機のオペレータは、ダンプニング装置のローラ組立体を完全に不要にすることができ、インキング／コーティング装置１０は、水性インキ及びコーティングをフレキソ又は乾式印刷版及びブランケットに選択的に付着させることができる。さらに、水性インキ及びコーティングのオーバープリントを、次の印刷ユニットで実施することができる。というのは、水性インキ及びコーティングは、高速高温空気インターステーション乾燥装置及び大容量熱及び水分エキストラクタ組立体によって完全に乾くからである。

【0042】

本発明で用いるような水性インキ及びコーティングは、着色顔料及び／又は可溶性染料、着色顔料を印刷枚葉紙の表面上に固定する結合剤、ワックス、脱泡剤及び増粘剤を含有する。水性印刷インキの含有主成分は、溶剤、希釈剤及び／又はビヒクルとしての水である。好ましい増粘剤は、アルゴネート類 (algonates)、スターチ、セルロース及びその誘導体、例えばセルロースエステル又はセルロースエーテル等を含む。有機物だけではなく無機物顔料を含む着色剤を、水に溶けない染料から誘導してもよい。また、印刷インキは水を含んでも良いが、主成分としてグリコール等を含み、顔料は適当な樹脂で結合される。金属粉インキを印刷する場合、アニロックスローラのセルを適当に寸法決めして金属粒子がセル内で不動状態になるのを阻止する必要がある。セルのサイズは重要であり、金属の金粉のインキについては、アニロックスローラは、１インチ当たり１７５～３００本のライン（１ｃｍ当たり６９～１１８本の範囲）のスクリーンラインカウント (screen line count)を有する必要がある。

【0043】

インキング／コーティング装置１０はまた、紫外線硬化性インキ及びコーティングを施すことができる。もし紫外線硬化性インキ及びコーティングを利用する場合、紫外線乾燥装置／エキストラクタは、高速高温空気乾燥装置／エキストラ

クタユニット１１２，１１４に隣接して設置される。

【００４４】

本明細書で開示したインキング／コーティング装置１０により、印刷ユニットをフレキソ印刷モード又は平版印刷モードのいずれかで選択的に動作させることができると共に版又はブランケット位置のいずれかから印刷又はコーティングを行うことができる。本発明のデュアルクレードル支持構成により、ゴム胴位置のインキング／コーティングから版胴位置のインキング／コーティングまで最短の印刷機運転停止時間で素早く切り換えることができる。というのは、印刷／インキング装置が引込み位置にある状態で、アプリケータローラ６６を取り外して再位置決めし、又は交換する必要があるだけだからである。

【００４５】

さらに、印刷機のオペレータは、一作業で版から水性インキ／コーティングでスポット又はオーバーオール状態のコーティングを行い、そして次の作業でブランケットからスポット及び／又はオーバーオール状態のコーティングを行うよう段取りをつけることができる。ドクターブレード組立体を素早くフラッシして洗浄することができると共にアプリケータローラを素早く交換することができるので、最初の印刷機の運転中に版位置又はブランケット位置から水性インキ又はコーティングでスポット状態又はオーバーオール状態のコーティングを行い、次に次の印刷機の運転中に版位置又はブランケット位置から紫外線硬化性インキ又はコーティングでスポット状態又はオーバーオール状態のコーティングを行うことができる。インキング／コーティング装置１０は引込み位置にあって完全に離れて邪魔にならないところに位置しており、したがってドクターブレードリザーバ及び供給ラインを、印刷ユニットが別の仕事の印刷を行っている間に自動洗浄機器によってフラッシして洗浄することができる。

【００４６】

版及びブランケットに対するアプリケータローラヘッド及びローラ組立体の位置決めは、所定のあらかじめ設定された刷り位置に引込み自在である。その結果、印刷ユニットの調整又は変更は不要である。ただし、異なる種類のインキ又はコーティング材料を使うようドクターブレード組立体をフラッシしてアプリケー

タローラ６６をクリーニングし又は交換することが必要である。例示の実施例と関連して手動の伸縮操作を説明したが、作動位置への伸長及び不作動遊び位置への引っ込みを、油圧モータサーボ機構又は電気モータサーボ機構によって自動的に行うことができる。

【００４７】

フェリスホイール支持構造により、インキング／コーティング装置は印刷機の最初の印刷ユニット及び最後の印刷ユニットについてだけではなく、任意の隣合う印刷ユニット間のインターステーション空間内で効果的に作動することができ、この場合インターステーション空間を塞いだり遮ることなく又は印刷ユニットのうちの任意の胴へのオペレータの接近を制限することはない。

【００４８】

最後に、本発明のインキング／コーティング装置は印刷ユニットタワー部に取り付けられ、印刷ユニットの胴の調整又は変更を必要としないで作動位置に伸長できるので、印刷インキ又はコーティング材料を、枚葉紙オフセット輪転印刷機のゴム胴又は専用塗工ユニットのブランケットに付着させるのに用いることができる。

【００４９】

【図面の簡単な説明】

【図１】

本発明を具体化したインキング／コーティング装置を備えた枚葉紙オフセット輪転印刷機の概略側面図である。

【図２】

デュアルヘッド型インキング／コーティング装置が作動コーティング位置にあり、単一のヘッド塗工機が引込みオーバーヘッド位置にある図１の印刷機の斜視図である。

【図３】

作動位置にある図１の単一ヘッド型インキング／コーティング装置の一方の側を示す拡大簡略斜視図である。

【図４】

ブランケット位置からのスポット又はオーバーオール状態のコーティングのために作動コーティング位置にあるデュアルヘッド型インキング／コーティング装置を示す簡略側面図である。

【図５】

版位置からスポット又はオーバーオール状態のコーティングを施すために作動コーティング位置にある単一ヘッド型インキング／コーティング装置を示す簡略側面図である。

【図６】

油圧駆動組立体及びドクターブレード組立体を示す図４のデュアルヘッド型インキング／コーティング装置の部分切欠き簡略側面図である。

【符号の説明】

１０，１１０　インライン型インキング／コーティング装置
１２　枚葉紙又は巻取紙オフセット輪転又はフレキソ印刷機
２２，２４，２６，２８　印刷ユニット
３２　版胴
３４　ゴム胴
３６　圧胴
３８　インターユニット渡し胴
４０　インターステーション渡し胴
５２　インキングローラ装置
５８　キャリジ組立体
６０　アプリケータヘッド
６２　駆動モータ
６６　アプリケータローラ
６８　ドクターブレード組立体
７４，７６　サイドフレーム部材
７８，８０　クレードル
７９，８１　ソケット
８８，９０　片持ち支持アーム

１０４　空気圧シリンダ

１０８　ピボット式リンク装置

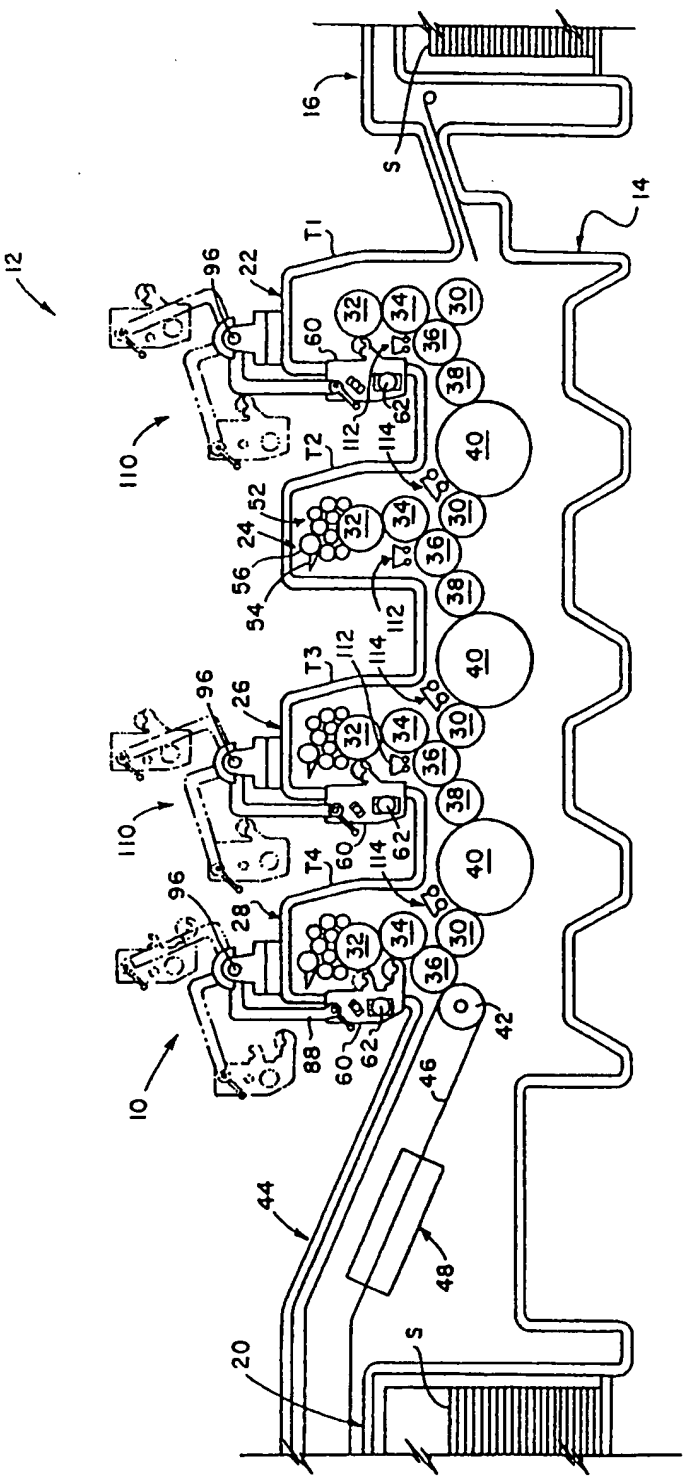
１１１　ベルクランク

１１２，１１４　乾燥装置／エキストラクタユニット

１１９　停止部材

【書類名】 図面

【図１】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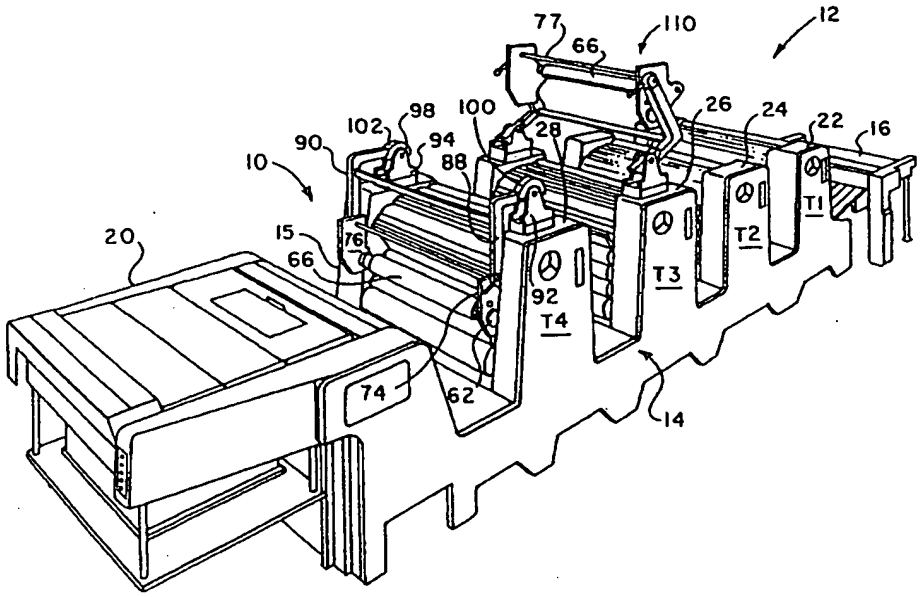
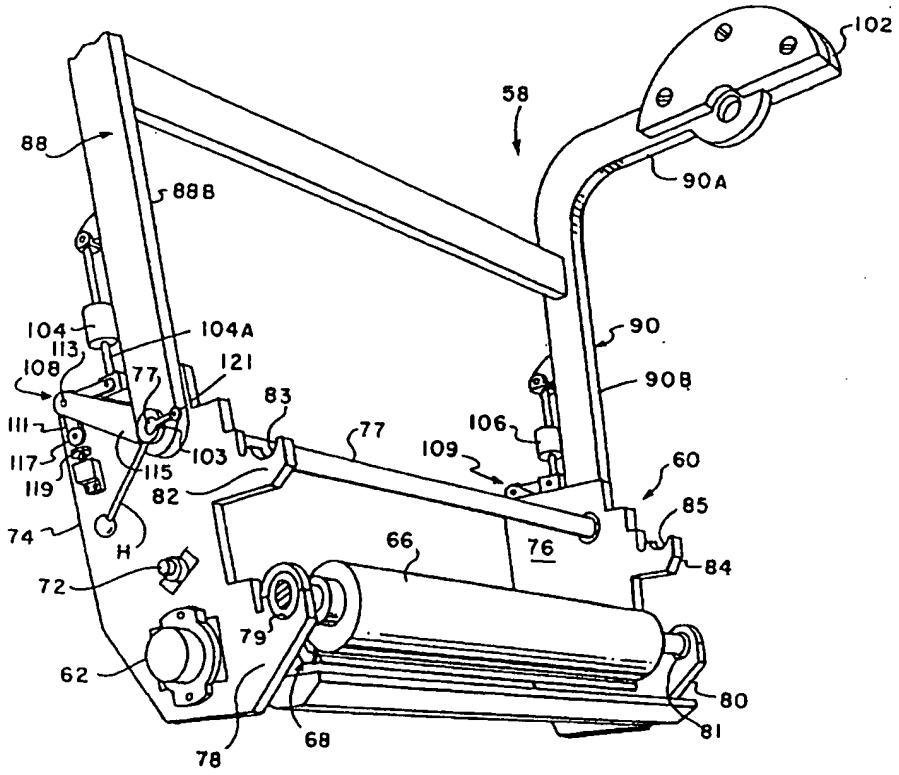
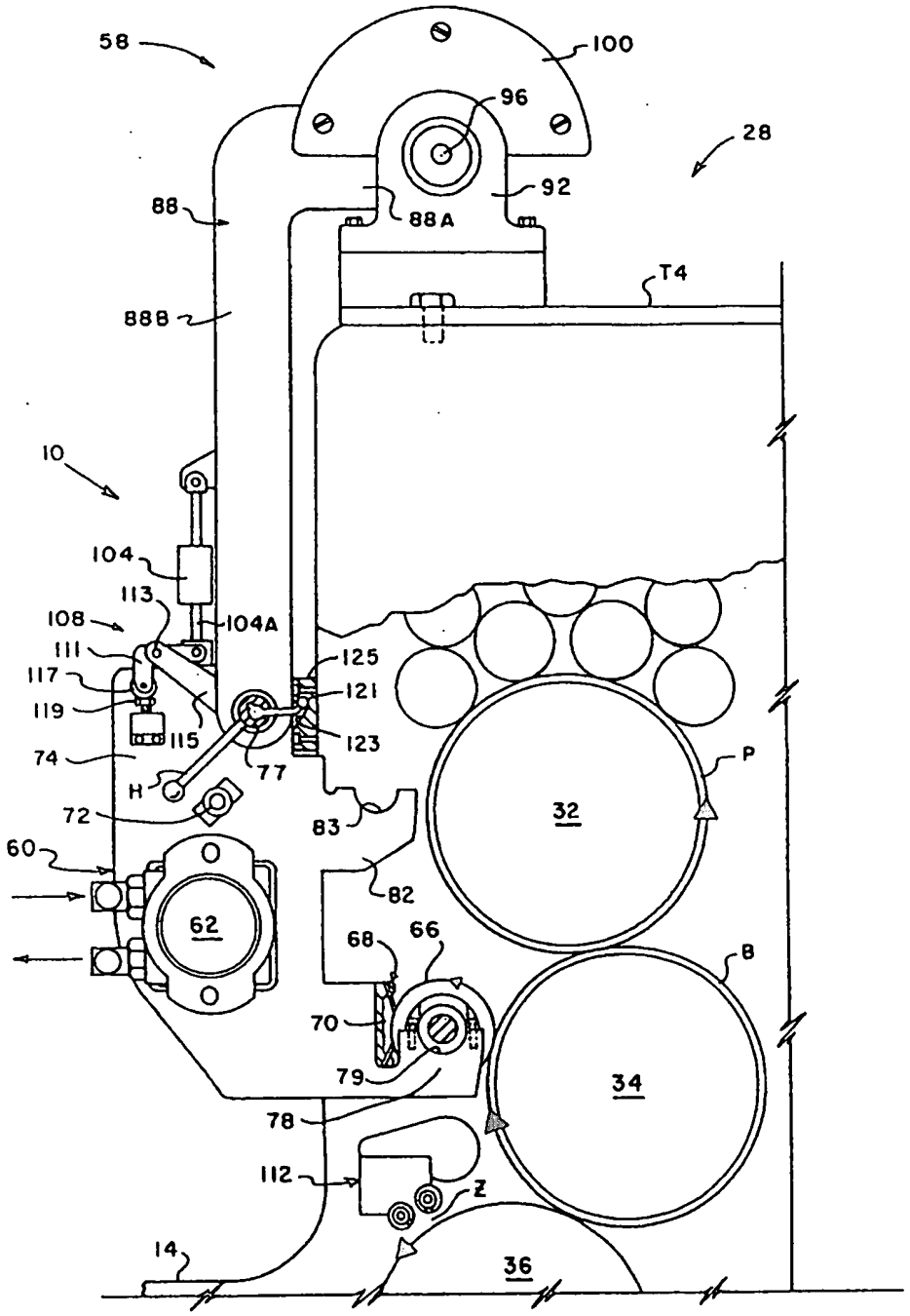
【図２】



【図３】



【図４】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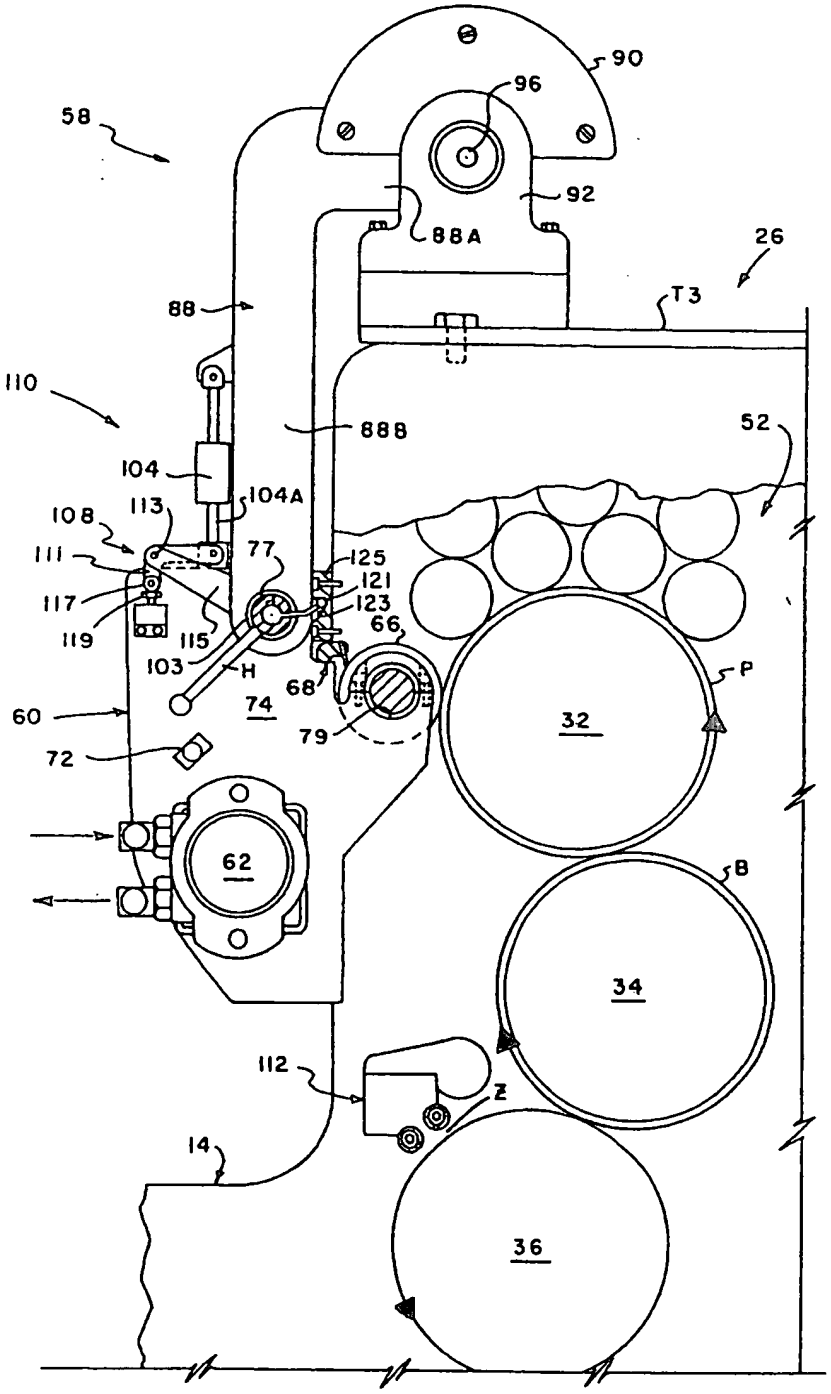
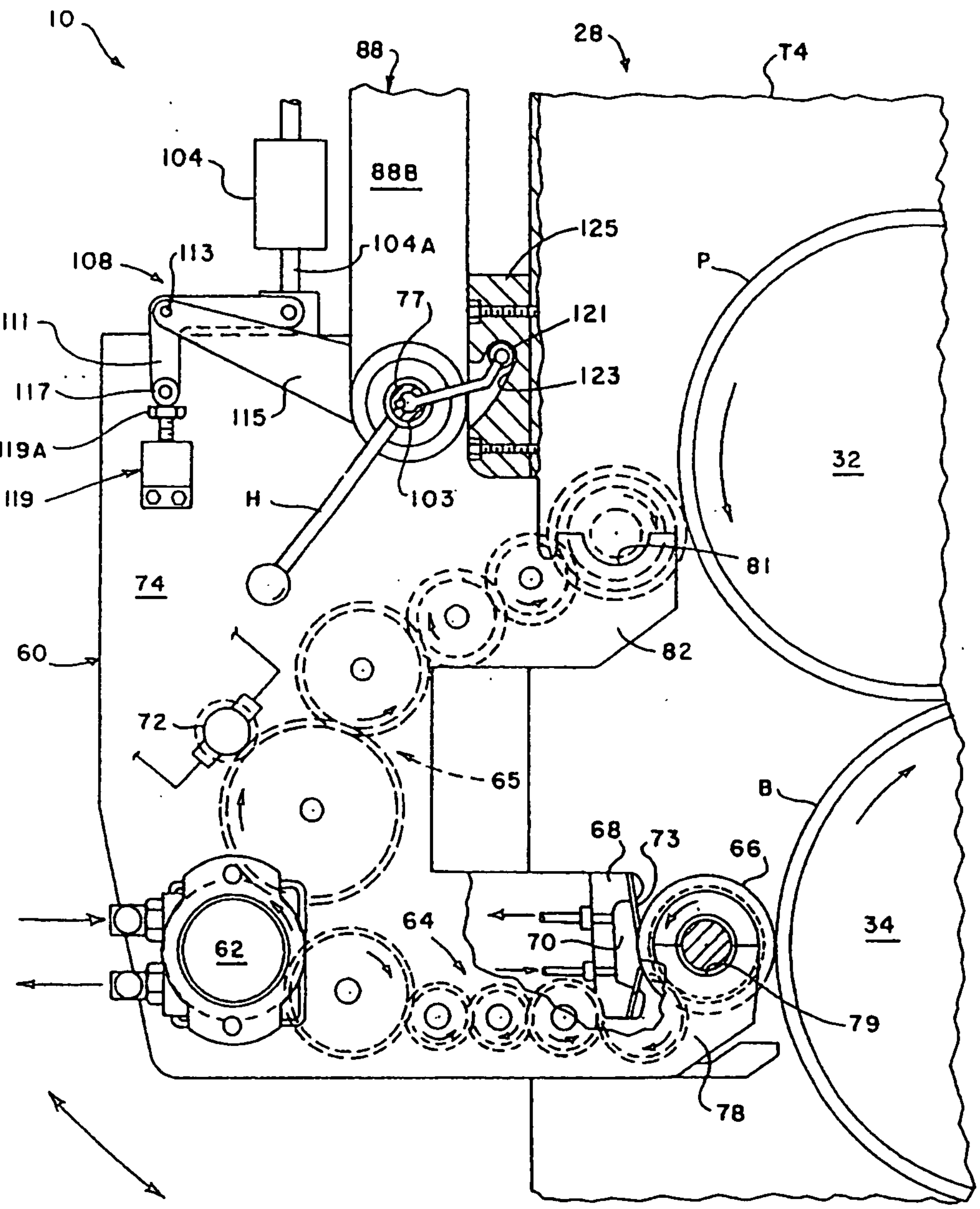
【図５】



【図6】



【書類名】　要約書

【要約】

【課題】　オフセット輪転印刷機のゴム胴に取り付けたブランケット又はフレキソ版又は版胴に取り付けたフレキソ版に、インキ／コーティング材料をスポット又はオーバーオール状態のいずれかで選択的に付着させる引込み自在なインライン型インキング／コーティング装置を提供する。

【解決手段】　インキング／コーティング装置（10）は、印刷ユニット又は専用塗工ユニット（22 28 ）のタワー部に回動自在に取り付けられていて、印刷ユニットのタワー部に回動自在に結合されているキャリジ組立体により、インキング／コーティング位置に伸長したり、この位置から引っ込むことができる。回動支持手段として片持ち支持アームが用いられているので、インキング／コーティング装置は、隣り合う印刷ユニット間のフェリスホイール円弧運動で伸長したり引っ込んだりすることができる。

【選択図】　図１

拒絶理由通知書

特許出願の番号	平成　８年　特許願　第１４６３７１号
起案日	平成１０年　６月１８日
特許庁審査官	青木　和夫　　７１１９　２Ｃ００
特許出願人代理人	加藤　紘一郎　　（外　２名）殿
適用条文	第３６条

この出願は、次の理由によって拒絶をすべきものである。これについて意見があれば、この通知書の発送の日から３か月以内に意見書を提出されたい。

理　由

１．　この出願は、特許請求の範囲の記載が下記の点で、特許法３６条第６項第１号に規定する要件を満たしていない。

記

請求項１に係る発明において、「インキ又はコーティング材料を、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに個別又は同時のいずれかで付着させるアプリケータヘッド」という構成の「同時」は、ある印刷ユニット内において版胴、ゴム胴に対して同時にという場合を包含していると認められるが、これは発明の詳細な説明に記載されていない技術的事項と認められる。

よって、請求項１に係る発明は、発明の詳細な説明に記載したものでない。

２．この出願は、特許請求の範囲の記載が下記の点で、特許法第３６条第６項

続葉有

部長	審査長	審査官	審査官補
	青木　和夫	青木　和夫	
	７１１９	７１１９	

Paper for Rejection

続　葉

第２号に規定する要件を満たしていない。

記

請求項１８における「水性又は紫外線硬化性印刷インキマニホルド湖はコーティング材料」の「印刷インキマニホルド湖」は、意味が不明瞭であるし、発明の詳細な説明中においても関連する記載が認められない。

よって、請求項１８に係る発明は明確でない。

この拒絶理由通知書中で指摘した請求項以外の請求項に係る発明については、現時点では、拒絶の理由を発見しない。拒絶の理由を新たに発見された場合には拒絶の理由が通知される。

先行技術文献調査結果の記録

・調査した分野　　ＩＰＣ第６版
Ｂ４１Ｆ３１／１４、３１／３０、１３／００、２３／０８
ＤＢ名

・先行技術文献
特開昭６３－６２７３３号公報

この先行技術文献調査結果の記録は、拒絶理由を構成するものではない。

この拒絶理由通知書の内容に関する質問等がある場合は下記まで連絡して下さい。

審査第２部事務機器　TEL 03(3581)1101 内線3221～3223

【書類名】　手続補正書

【提出日】　平成10年10月27日

【あて先】　特許庁長官　殿

【事件の表示】

　【出願番号】　平成 8年特許願第146371号

【補正をする者】

　【事件との関係】　特許出願人

　【識別番号】　593102714

　【氏名又は名称】　ハワード　ウォーレン　デムーア

【代理人】

　【識別番号】　100088454

　【弁理士】

　【氏名又は名称】　加藤　紘一郎

　【電話番号】　0797-38-3240

【手続補正　1】

　【補正対象書類名】　明細書

　【補正対象項目名】　特許請求の範囲

　【補正方法】　変更

　【補正の内容】　1

【手続補正　2】

　【補正対象書類名】　明細書

　【補正対象項目名】　００３０

　【補正方法】　変更

　【補正の内容】　6

【特許請求の範囲】

【請求項１】　版胴、ゴム胴及び圧胴が回転自在に取り付けられた印刷ユニットを備えた形式の印刷機に用いられるインキング／コーティング装置において、インキング／コーティング装置が版胴及びゴム胴に対して作動位置にあるときに、インキとコーティング材料を、版胴に取り付けられた版とゴム胴に取り付けられたブランケットに選択的に付着させるアプリケータヘッドと、アプリケータヘッドを、アプリケータヘッドが版胴及びゴム胴に横方向に隣接して配置された作動位置に移動させたり、アプリケータヘッドを、アプリケータヘッドが版胴及びゴム胴に対して高い位置にある引込み位置に移動させるキャリジ組立体とを有することを特徴とするインキング／コーティング装置。

【請求項２】　キャリジ組立体は、印刷ユニットに回動自在に取り付けられるよう構成された第１の端部及びアプリケータヘッドに回動自在に結合された第２の端部を備えた支持アームを有し、アプリケータヘッドは、支持アームで支えられた状態で作動位置に移動できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項３】　バランスウェイトは、キャリジ組立体に結合されていることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項４】　アプリケータヘッドは、インキ又は液状コーティング材料を受け入れるリザーバを備えたドクターブレード組立体と、リザーバと連通状態でドクターブレード組立体に結合されたアプリケータローラとを有し、アプリケータローラは、アプリケータヘッドが作動位置にあるときに、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに係合できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項５】　アプリケータローラは、弾性移送面を備えたアニロックスローラであることを特徴とする請求項４記載のインキング／コーティング装置。

【請求項６】　アプリケータヘッドに可動に結合されていて、伸縮自在な動力伝達アームを備えた動力アクチュエータと、動力伝達アームに結合されていて、動力伝達アームの伸縮運動をキャリジ組立体に対するアプリケータヘッドの回動運動に変換する運動変換装置とを有することを特徴とする請求項１記載のイン

キング／コーティング装置。

【請求項７】　運動変換装置は、動力伝達アームに結合された第１の端部及びアプリケータヘッドに固定された停止部材に係合する第２の端部を備えたベルクランクプレートと、キャリジ組立体に固定されていてベルクランクプレートに回動自在に結合されたクレビスプレートとを含むことを特徴とする請求項６記載のインキング／コーティング装置。

【請求項８】　アプリケータヘッドは、キャリジ組立体に回動自在に結合された第１及び第２のサイドフレーム部材と、第１及び第２のサイドフレーム部材に取り付けられていて、インキ又は液状コーティング材料を受け入れるリザーバを含むドクターブレード組立体と、第１及び第２のサイドフレーム部材にそれぞれ取り付けられたクレードル組立体と、クレードル組立体に回転自在に取り付けられると共にドクターブレード組立体に結合されていて、転動しながらリザーバ内のインキ又はコーティング材料と接触し、アプリケータヘッドが作動位置にあるとき、版胴に取り付けられた版又はゴム胴に取り付けられたブランケットに係合できるアプリケータローラと、アプリケータローラに結合されていて、アプリケータローラを回転させる駆動モータとを有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項９】　クレードル組立体は、第１及び第２のサイドフレーム部材にそれぞれ設けられた第１及び第２のソケットを有し、アプリケータローラは、第１及び第２のソケットに回転自在に取り付けられていることを特徴とする請求項８記載のインキング／コーティング装置。

【請求項１０】　クレードル組立体は、第１及び第２のサイドフレーム部材にそれぞれ設けられた第１及び第２のソケットと、第１及び第２のサイドフレーム部材にそれぞれ設けられた第３及び第４のソケットとを有し、アプリケータローラは、アプリケータヘッドが作動位置にあるとき、インキ又はコーティング材料を版又はブランケットのいずれかに付着させるよう第１及び第２のソケット又は第３及び第４のソケットのいずれかに回転自在に選択的に取り付けることができることを特徴とする請求項８記載のインキング／コーティング装置。

【請求項１１】　アプリケータヘッドは、インキング／コーティング装置が

作動位置にあるとき、版に係合できるようアプリケータローラを支持する第１のクレードルと、インキング／コーティング装置が作動位置にあるとき、ブランケットに係合できるようアプリケータローラを支持する第２のクレードルとを有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１２】 キャリジ組立体は、印刷ユニットに回動自在に結合された第１の端部、及び第２の端部を備えた支持アームと、支持アームの第２の端部及びインキング／コーティング装置が回動自在に取り付けられた共通のピボットシャフトと、共通ピボットシャフトと印刷ユニットとの間に結合された雄型及び雌型ラッチ部材とを有し、ラッチ部材のうち一方は、共通ピボットシャフトに固定され、他方のラッチ部材は、印刷ユニットに取付け自在に構成され、ラッチ部材は、アプリケータヘッドが作動位置にあるときに、インターロック係合状態で相互に嵌合できることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１３】 アプリケータヘッド及び印刷ユニットは、キャリジ組立体及び印刷ユニットに取り付けられていて、アプリケータヘッドが作動位置にあるときに、キャリジ組立体を印刷ユニットに対してインターロック係合状態に解除自在に係止する雄型及び雌型ラッチ結合部材を有することを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１４】 キャリジ組立体は、細長いシャンク部分及びハブ部分を有し、細長いシャンク部分は、アプリケータヘッドに回動自在に結合され、ハブ部分は、印刷ユニットに回動自在に取り付けられるよう構成されていることを特徴とする請求項１記載のインキング／コーティング装置。

【請求項１５】 第１及び第２の印刷ユニットを有するオフセット輪転印刷機であって、請求項１記載のインキング／コーティング装置が請求項１に記載されているように第１の印刷ユニットに可動に結合されていて、第１の印刷ユニットの圧胴に隣接して第１の印刷ユニットに取り付けられていて、印刷されたばかりの基材が圧胴と接触しているときに、加熱空気を送風して印刷基材に当てる乾燥装置を有することを特徴とするオフセット輪転印刷機。

【請求項１６】 高温空気、水分及び揮発分を乾燥装置と印刷基材との間の

暴露域から除去するためのエキストラクタが、乾燥装置に隣接して配置されていることを特徴とする請求項１５記載のオフセット輪転印刷機。

【請求項１７】 中間渡し胴が、第１の印刷ユニットの圧胴と枚葉紙移送関係をなして結合され、インターステーション乾燥装置が、中間渡し胴に隣接して配置されていて、印刷又は被覆が施されたばかりの基材を第１の印刷ユニットの圧胴から移送したあとであって、中間渡し胴と接触しているときに、加熱空気を送風して基材に当てるようになっていることを特徴とする請求項１５記載のオフセット輪転印刷機。

【請求項１８】 第１及び第２のオフセット輪転印刷ユニットを含む形式の印刷機で、少なくとも第１の印刷ユニットの作動中に水性又は紫外線硬化性印刷インキ又はコーティング材料を用いてオフセット輪転印刷をする方法において、版を水性インキ／水性コーティング材料又は紫外線硬化性インキ／紫外線硬化性コーティング材料によりスポット又はオーバーオール状態でコーティングし、ブランケットを水性インキ／水性コーティング材料又は紫外線硬化性インキ／紫外線硬化性コーティング材料によりスポット状態であると共に、或いはオーバーオール状態でコーティングし、印刷インキ又はコーティング材料を印刷版からブランケットに転移し、基材が圧胴とブランケットとの間のニップを通って移送されているときに、インキング又はコーティングされた画線をブランケットから基材に転移し、基材が次の処理を施される前に、印刷基材上のインキ又はコーティング材料を乾燥させ、上記工程を各印刷ユニットで連続して実施することを特徴とするオフセット輪転印刷方法。

【請求項１９】 乾燥工程では、印刷／被覆が施されたばかりの基材が第１の印刷ユニットの圧胴と接触しているときに高速加熱空気を送風して基材に当てることを特徴とする請求項１８記載のオフセット輪転印刷方法。

【請求項２０】 印刷基材を第１の印刷ユニットから中間渡し胴に移送し、印刷基材が中間渡し胴と接触しているときに印刷基材を乾燥させることを特徴とする請求項１８記載のオフセット輪転印刷方法。

【請求項２１】 印刷／被覆が施されたばかりの基材が圧胴と接触しているときに基材上の暴露域から高温空気、水分及び揮発分を除去することを特徴とす

る請求項１８記載のオフセット輪転印刷方法。

【請求項２２】 水性コーティング材料又は紫外線硬化性コーティング材料のプライマーコーティングを第１の印刷ユニット内で基材に施し、基材が第２の印刷ユニット内で処理される前に、基材上のプライマーコーティングを乾燥させることを特徴とする請求項１８記載のオフセット輪転印刷方法。

【００３０】

版Ｐが刷りを行うと、動力が空気圧アクチュエータ１０４に及ぼされ、動力伝達アーム１０４Ａが引っ込み、かくしてベルクランク１１１がピン１１３の回りに反時計方向に回転する。空気圧アクチュエータ１０４によって及ぼされたトルクは、カムローラ１１７及び可調式停止部材１１９を介してアプリケータヘッド６０に伝達される。支持シャフト７７に対するアプリケータヘッド６０の反時計回りの動作により、アプリケータローラ６６は版Ｐと係合するようになる。

【書類名】　意見書

【提出日】　平成10年10月27日

【あて先】　特許庁審査官　青木　和夫　殿

【事件の表示】

　【出願番号】　平成 8年特許願第146371号

【特許出願人】

　【識別番号】　593102714

　【氏名又は名称】　ハワード　ウォーレン　デムーア

【代理人】

　【識別番号】　100088454

　【弁理士】

　【氏名又は名称】　加藤　紘一郎

　【電話番号】　0797-38-3240

【発送番号】　084987

【意見の内容】　1

Argument

平成１０年６月３０日発送の拒絶理由通知書示された審査官の認定を検討し、本出願人は別途提出の手続補正書において特許請求の範囲を補正していますので、補正事項に基づいて再度の審査をお願いします。そこで、補正の内容を簡単に説明します。

理由１に関し、明細書における開示内容では、図３及び図４に示されたデュアルクレードル構成（７８，８０；８２，８４）は、アプリケータヘッド６０がインキとコーティング材料を版Ｐとブランケット Ｂに選択的に付着させるようになっています。そこで、このように請求項１の内容を補正しました

理由２に関し、これは単なる誤記であります。

さらに、明細書を検討し、誤記の存在が判明しましたので、手続補正２において誤記の訂正を行っています。

以上

特許査定

特許出願の番号	平成　８年　特許願　第１４６３７１号
起案日	平成１１年　１月　８日
特許庁審査官	青木　和夫　　　　　７１１９　２Ｃ００
発明の名称	印刷ユニット相互間でフェリス運動をする引込み自在なインキング／コーティング装置
請求項の数	２２
特許出願人	ハワード　ウォーレン　デムーア
代理人	加藤　紘一郎　　　　（外　２名）

この出願については、拒絶の理由を発見しないから、特許査定する。

Decision for Patent

部長	審査長	審査官	審査官補	分類確定官
	青木　和夫	青木　和夫		青木　和夫
	７１１９	７１１９		７１１９